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Sustainable Decision-Making: Non-Monetary Incentives for Pro-Social Behavior in the Energy Sector

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Abstract

Taking into account insights into the reality of human decision-making, is an important challenge for today's policymakers. Are there `cheaper´, more efficient and possibly as well more effective, non-financial ways of influencing the behaviour of private and corporate citizens, nudging them towards socially desired choices, for example, in the domain of energy consumption? Can such mechanisms complement or substitute for monetary incentives in fostering sustainable decision-making in policy relevant areas such as energy consumption? If so, what mechanisms might be feasible to implement in actual policymaking? Against this background, the Dutch Ministry of Economic Affairs (Ministerie van Economische Zaken) wants to know which "nudges" are the most suitable for application in the field of energy conservation. To this end, in this report we

(1) take stock what is known about the effects of non-monetary incentives in general, and legacy reminders in particular, in increasing individuals' regard for collective interests and for intergenerational beneficence, in particular in the domain of energy consumption (literature review);

(2) investigate in a laboratory setting the effects of selected non-monetary incentives on a selection of relevant decision tasks (laboratory experiments); and

(3) apply the insights from the literature review and laboratory experiments to specific instruments of policy-making in the Netherlands.

Keywords: Behavioral Economics, Choice Architecture, Nudge, Energy Efficiency

JEL classification: D01, D03, D04

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Inhoud

Managementsamenvatting

Gedragseconomie
Gedragseconomisch onderzoek stelt de individuele besluitvormer centraal. In aanvulling op traditioneel economisch onderzoek wijst de gedragseconomie op de belangrijke rol die zowel de motivatie van het individu als de invloed van de omgeving op het individu speelt in de besluitvorming. Gedragseconomisch onderzoek wijst uit dat individuen niet alleen op financiële prikkels reageren, maar dat hun keuze ook wordt beïnvloed door op het eerste oog irrelevante zaken, zoals bijvoorbeeld de volgorde waarin alternatieven worden voorgelegd of wanneer dezelfde uitkomst als een winst of verlies wordt omschreven. Dit betekent dat de manier waarop beslissingen worden gepresenteerd en keuzes worden voorgelegd, de zogenaamde keuzearchitectuur, mede bepalend is voor de uitkomst. Afhankelijk van de gekozen keuzearchitectuur zullen bepaalde gedragsuitkomsten dus eerder worden geobserveerd dan anderen. Door hier bewust mee om te gaan kunnen overheden het gedrag van individuele besluitvormers een zetje (*nudge*) geven in een richting die maatschappelijke wenselijk wordt geacht. In tijden van bezuinigingen is het extra belangrijk om te achterhalen of beleidsdoelen ook kunnen worden gerealiseerd door middel van deze niet-financiële prikkels. In het Verenigd Koninkrijk gebeurt dit al actief. Daar onderzoekt het door David Cameron ingestelde Behavioural Insight Team sinds 2010 hoe inzichten van wetenschappelijk onderzoek uit de gedragseconomie en de sociale psychologie kunnen worden toegepast op het overheidsbeleid en overheidsdiensten.

Onderzoeksvraag en opzet
De afgelopen tijd zijn er een aantal recente Europese veldstudies geweest op het gebied van energiebesparing die suggereren dat er door toepassing van inzichten uit de gedragseconomie winst is te behalen in de orde van grootte van 10%. In dit rapport staat daarom de vraag centraal welke gedragseconomische inzichten voor de Nederlandse overheid een potentieel interessant startpunt kunnen vormen voor het stimuleren van duurzame besluitvorming in het algemeen en energiebesparing in het bijzonder. Dit onderzoek is inventariserend van karakter. Voor de uiteindelijke toepassing van deze inzichten zijn veldexperimenten in de Nederlandse beleidscontext nodig. Voor de beantwoording van de onderzoeksvraag is gekozen voor een tweeledige aanpak. Enerzijds is een uitgebreid literatuuronderzoek gedaan, waarin theoretisch inzichten en de resultaten van relevante experimentele studies en empirische studies op basis van velddata zijn verzameld. Anderzijds zijn een aantal laboratoriumexperimenten uitgevoerd in aanvulling op de bestaande literatuur. Hierbij is expliciet aandacht besteed aan managers (een noviteit in de literatuur), die vanwege hun beslissingsbevoegdheid een relatief groot stempel op, bijvoorbeeld, energiegebruik, kunnen drukken.

Resultaten op hoofdlijnen
Op basis van de literatuur en de resultaten van de experimenten hebben we eerst acht gedragseconomische inzichten geïdentificeerd die in de context van duurzame besluitvorming/energiebesparing het meest relevant zijn:

Inzichten uit de wetenschappelijke literatuur	
Commitment	Om duurzaam keuzegedrag in de toekomst vast te leggen, werken instrumenten die besluitvormers daartoe vandaag committeren. Dergelijke instrumenten zijn vooral effectief wanneer er daadwerkelijk (kleine) kosten voor de besluitvormer mee verbonden zijn.
Standaardkeuze[1]	In het ontwerp van een instrument is de uitkomst in geval geen besluit wordt genomen van groot belang. Aangezien veel besluitvormers niet tot een keuze komen, is de standaardkeuze ('default') vaak het resultaat.
Informatie	Informatie over duurzaam handelen dient relevant en bondig te zijn.
Feedback	Feedback aan de besluitvormer dient tijdig en specifiek te zijn.
Referentiepunt en Sociale normen	Bij het nemen van een besluit wordt de status quo, eerdere keuzes van de besluitvormer en keuzes van een relevante referentiegroep meegewogen. Sociale normen zijn een potentieel krachtig instrument om duurzaam handelen te bewerkstelligen. Daarbij is de keuze van de referentiegroep essentieel: besluitvormers worden in sterkere mate beïnvloedt door andere die sociaal nabij zijn en tot dezelfde generatie behoren. Sociale en/of temporele afstand verkleinen de effectiviteit van sociale normen.
Rangschikking	Rangschikking als variatie op sociale normen zijn een potentieel krachtig instrument om duurzaam handelen te bewerkstelligen. Sociale en/of temporele afstanden verkleinen ook de effectiviteit van het maken van een rangorde. Het effect van 'naming and shaming' lijkt vooral gedreven door de wens om de schaamte te vermijden die komt met een lage plek in de rangorde.
Framing	Framing is cruciaal: kleine veranderingen in het ontwerp van een instrument kunnen een groot effect op de effectiviteit ervan uitoefenen. Online informatievoorziening (en feedback) is bijvoorbeeld aanzienlijk minder effectief dan offline informatieverschaffing.
Verantwoording	Verantwoording lijkt het effect op status en zelfbeeld te versterken. Indien verantwoording afgelegd moet worden over gemaakte keuzes wordt het effect van sociale normen sterker. Dit is vooral relevant voor managers die omwille van hun functie verantwoording verschuldigd zijn aan aandeelhouders en andere belanghebbenden.

[1] Standaardkeuzes zijn relevant voor duurzame besluitvorming in het algemeen, bijvoorbeeld voor instellingen van technische apparatuur, maar niet voor de beleidsinstrumenten die in dit rapport besproken worden.

In het onderzoek is voor twee beleidsinstrumenten bekeken welke van deze gedragseconomische inzichten gegeven de opzet van het instrument het meest interessant zijn: 1. de slimme meter en 2. meerjarenafspraken met het bedrijfsleven over energie-efficiency.

De slimme meter
Het eerste beleidsinstrument betreft de slimme meter in combinatie met tweemaandelijkse overzichten van verbruik en indicatieve kosten of directe feedback via een applicatie en/of een beeldscherm met precieze en tijdige informatie over het energieverbruik van de huishouding. In abstracto kunnen de tweemaandelijkse overzichten en directe feedback via een applicatie/beeldscherm gezien worden als informatie-/feedback-, communicatie- en zelfmonitoringinstrument.

Internationaal empirisch onderzoek geeft aan dat van slimme meters met een direct of indirect feedback mechanisme een energiebesparing te verwachten valt, waarbij de gevonden mate van extra besparing varieert tussen 4% en 12%. Wanneer consumenten energiebesparende maatregelen willen treffen is het belangrijk dat aan de slimme meter een feedback mechanisme wordt gekoppeld wat duidelijk maakt hoe deze maatregelen zich in besparingen vertalen. De frequentie, vorm en waarde van de geboden informatie is daarbij een voorname factor die het effect bepaalt. Zo toont onderzoek aan dat online verbruiksinformatie, die de verbruiker in staat stelt een vergelijking met een referentiegroep te maken, een zwakker effect heeft dan offline informatie. Online informatie bereikt bovendien slechts die consumenten die uit zichzelf al meer hechten aan duurzaam handelen. Hiernaast toont de literatuur aan dat directe feedback via bijvoorbeeld een applicatie/beeldscherm tot hoger energiebesparing leidt dan indirecte feedback via bijvoorbeeld schriftelijke tweemaandelijkse overzichten. Zo heeft KEMA voor Nederland geraamd dat slimme meters in combinatie met twee maandelijkse overzichten (indirecte feedback) of displays (directe feedback) een gemiddelde besparing van respectievelijk 3,2% en 6,4% opleveren voor elektriciteit en respectievelijk 3,7% en 5,1% voor gas.

De empirische bevindingen van het onderzoek bevestigen eerder werk goeddeels. Instrumenten die commitment bevorderen zijn volgens internationaal empirische onderzoek vooral effectief wanneer het instrument de consument vraagt doelstellingen voor energiebesparing te expliciteren waarna vervolgens in de energierekening verwezen wordt. Gegeven de situatie in Nederland zou het vermelden van doelstellingen op de energierekening of bij de tweemaandelijkse overzichten een mogelijke optie kunnen zijn die het onderzoeken waard is. Ook toont het onderzoek aan dat deze instrumenten effectiever zijn als het commitment zichtbaar is en als het gerelateerd is aan onmiddellijke voordelen voor de besluitvormer, in de vorm van een lagere energierekening. Ten aanzien van het communiceren van sociale normen (bijvoorbeeld het gemiddelde energieverbruik van de buurt of wijk) blijkt uit dit onderzoek dat het van belang is dat de consument zelf geen grote invloed op de norm heeft. Voor maximale effectiviteit moet de referentiegroep dus niet te klein zijn en tegelijkertijd psychologisch relevant voor de consument. In veldonderzoek werd een energiebesparingspotentieel door het communiceren van sociale normen van 2%-6% aangetoond. Het publiceren van een

rangorde van (groepen) huishoudens, bijvoorbeeld op wijkniveau, die de relatieve positie/ prestatie weergeeft zou aanvullende energiebesparing kunnen opleveren.

Meerjarenafspraken met het bedrijfsleven over energie-efficiency
Het tweede beleidsinstrument zijn de meerjarenafspraken op industrieniveau (MJA3-convenant en MEE-convenant). In abstracto kunnen deze afspraken gezien worden als een instrument dat het expliciteren van doelstellingen en zelfmonitoring beoogt.

Eerder onderzoek toont aan dat de effectiviteit van het stellen van doelen afhangt van de mate waarin deze (publiek) bekend zijn. Ook is eerder aangetoond dat besluitvormers meer gecommitteerd worden door stapsgewijs naar grotere duurzaamheidsdoelstellingen te bewegen. Incrementele kleinere stappen hebben een grotere kans van slagen dan een grote stap ineens. De literatuur op het terrein van niet-financiële prikkels die energiebesparing door managers proberen te bewerkstelligen, zoals het effect van rangschikking en normen, is beperkt in omvang, zeker in vergelijking met de literatuur die zich op het keuzegedrag van huishoudens richt. De empirische bevindingen suggereren dat het opstellen van langetermijnakkoorden op zichzelf al een effect kan hebben op het stellen van doelen en verkrijgen van commitment. Uit eerdere literatuur blijkt bovendien dat indien te behalen voordelen in termen van netto contante waarde worden gepresenteerd, het te verwachten psychologische effect op het keuzegedrag van managers vermoedelijk het grootst is. Ons onderzoek suggereert dat het afleggen van verantwoording over het gesloten akkoord naar relevante belanghebbenden een aanvullend positief effect kan hebben. Ons onderzoek suggereert bovendien dat anticipatie van de rankschikking een belangrijke rol speelt. Een positief effect valt al te verwachten van het opstellen van (beperkte) ranglijsten van ondernemingen binnen relevante vergelijkingsgroepen op willekeurige momenten.

De tabellen aan het eind van deze samenvatting geven per beleidsinstrument aan welke effecten in de literatuur en onze eigen laboratoriumexperimenten zijn gevonden, wat de openstaande vragen zijn en welk vervolgonderzoek gewenst is. De resultaten van het literatuuronderzoek zijn bevindingen uit eerdere laboratoriumonderzoek evenals veldstudies en veldexperimenten. Aangezien de resultaten van de verschillende studies niet kunnen worden gewogen vanwege verschillen in de opzet is er voor gekozen de maximaal gevonden gemiddelde effecten te rapporteren. De variantie van de gerapporteerde effecten komt deels door het verschil van laboratorium en veldonderzoek, en deels door de combinatie van direct of indirect feedback met een nudge. In het laboratorium worden doorgaans grotere effecten gevonden dan in veldonderzoek. Indien feedback over het feitelijke energiegebruik wordt gecombineerd met een nudge kan dit de effectiviteit van de feedback mogelijk verhogen en derhalve tot hogere besparingspercentages leiden.

Conclusies en aanbevelingen
Nudges hebben de potentie om consumenten en bedrijven aan te zetten tot duurzame keuzes en hiermee energie-efficiëntie te bevorderen. Hoewel onze onderzoeksresultaten verkennend zijn wijzen ze op een aantal potentieel krachtig instrumenten: door de beslissers in huishoudens, bedrijven en organisaties te confronteren met sociale normen

en rangschikking is het mogelijk hun (bewuste en onbewuste) zelfbeeld actief aan te spreken om duurzamere besluitvorming te stimuleren.

Het onderzoek geeft aanleiding tot het doen van een aantal aanbevelingen voor beleid:

- De bevindingen suggereren dat duurzaam gedrag bevorderd kan worden door ranglijsten van (groepen) consumenten op te stellen, door managers aan te geven hoe zij ten opzichte van een relevante sociale referentiegroep presteren en door managers te vragen duurzaamheidsbeslissingen expliciet te verantwoorden.
- Bij al deze aanbevelingen is het van belang dat het onderliggende probleem gecommuniceerd wordt in een context die nauw aansluit op de belevingswereld van de besluitvormer; zowel in de geografische, temporele als sociale dimensie. Dit suggereert bijvoorbeeld dat nadruk op betere lokale luchtkwaliteit of grotere energievoorzieningzekerheid een groter effect zou hebben dan nadruk op de gevolgen van mondiale klimaatverandering.
- In de onderzochte beleidsinstrumenten slimme meters en meerjarenafspraken kan bewust gebruik worden gemaakt van nudges die meer duurzame keuzes uitlokken. Ons onderzoek heeft bij beide instrumenten verschillende aangrijpingspunten voor aanpassingen geïdentificeerd:
    - Bij de slimme meter in combinatie met tweemaandelijkse overzichten zijn toepassing van commitment, sociale normen en framing kansrijk voor het vergroten van de gerealiseerde energiebesparing. Wij adviseren deze aangrijpingspunten te toetsen met veldexperimenten.
    - Bij de slimme meter zijn pilots uitgevoerd met directe feedback. Bij de verdere uitrol adviseren wij ook te toetsen op de effecten van sociale normen en framing als deze via een in-home display gecommuniceerd worden.
    - Bij de meerjarenafspraken biedt de toepassing van sociale normen en rangschikking mogelijkheden om de effectiviteit te vergroten. Wij adviseren om veldexperimenten op deze aangrijpingspunten uit te voeren. De gegevens uit verslagen van ondernemers op basis van bestaande meerjarenafspraken kunnen worden benut om de effecten van commitment in kaart te brengen.

Met veldexperimenten kan nader onderzocht worden op welke wijze het effect van de instrumenten kan worden vergroot. Beslissingen aangaande duurzaamheid variëren bijvoorbeeld in de mate waarin individuele en collectieve belangen verschillen en ook in de mate waarin individuele afwijkingen van het collectieve belang gevolgen hebben. Veldexperimenten zijn ook nodig om te toetsen of laboratoriuminzichten zich voordoen in de praktijk. Nader onderzoek dient uit te wijzen of de bevindingen die in dit rapport gerapporteerd worden, ook toepasbaar zijn op beleidscontexten die duurzaam handelen betreffen maar minder naar een publiek goed te abstraheren zijn (de setting van de laboratoriumexperimenten). Tevens is het zo dat andere doelgroepen dan die welke in de experimenten zijn opgenomen afwijkend kunnen reageren op de onderzochte condities.

Toekomstig onderzoek zou zich moeten richten op de mate waarin de bevindingen in het veld gerepliceerd kunnen worden. Alleen gerandomiseerde veldstudies die (1) de invloed

op het gedrag over een langere periode volgen en (2) de behandeling nauwgezet toesnijden op de daadwerkelijk te ontwikkelen instrumenten, kunnen kwantitatieve en causale verbanden blootleggen. Dergelijke studies kunnen uitsluitsel geven over de effectiviteit van niet-financiële beleidsinstrumenten in het bevorderen van duurzaam keuzegedrag.

Tabel 1: Belangrijkste relevante bevindingen t.a.v. Slimme Meters en Tweemaandelijkse Overzichten[2]

Relevante nudges	Resultaten uit het literatuuronderzoek, laboratoriumexperimenten, en case studies	Openstaande vragen	Implicaties voor verder onderzoek
Informatie feedback	• Feedback over energieverbruik door middel van geavanceerde factureringspraktijken heeft een positief effect (max. 9% in het veld, en max. 20% in het lab). • Advies over besparingspotentieel heeft een positief effect (max. 5% in het veld). • Online informatie heeft geen significant effect, in tegenstelling tot offline informatie die een significant positief effect heeft. • Informatie moet tijdig, bondig, maar goed gepresenteerd en makkelijk te absorberen, worden verstrekt. • Informatie moet besparingen / voordelen in het heden benadrukken.	Het is niet duidelijk hoe de consumenten die het minst geïnteresseerd zijn bereikt kunnen worden, omdat informatie gemakkelijk kan worden genegeerd. Waarschijnlijk kunnen een combinatie van zeer specifieke adviezen en aanverwante monetaire gevolgen (potentiële winsten en verliezen van veranderingen in gedrag) effectief zijn, bijvoorbeeld als "U verliest op dit moment € x per maand door het niet consequent uitzetten van uw verlichting." Het doel moet zijn om gewoonten te veranderen om duurzame effecten te bereiken.	De analyse van de gegevens van de eerste uitrol van slimme meter in vergelijking met de controlegroep zal inzichten over het effect in Nederland geven. Marktonderzoek moet uitwijzen hoe informatie kan worden verstrekt op een effectieve en efficiënte manier, en hoe het bewustzijn van energieverbruikers het beste kan worden gestimuleerd..
Commit-ment en het stellen van doelen	• Privaat commitment heeft een positief effect (max. 12% in het lab). • Publieke toezegging (bijvoorbeeld ondertekende verklaringen) heeft een positief effect (max 15% in het veld).	Vrijwillige doelen voor specifieke besparing kunnen worden opgenomen in opvolgende tweemaandelijkse overzichten, maar het is niet duidelijk of dit zal leiden tot een blijvend effect, dat wil zeggen: verandering van gewoonten.	Veldstudies in Nederland (gerandomiseerde gecontroleerde trials) naar het effect van commitment en het stellen van doelen.
Sociale normen	• Sociale normen reduceren energieverbruik (2% -6% in het veld) • Beschrijvende en beoordelende normen hebben geen significant effect op individuen in strategische situaties (in het laboratorium)	Welke sociale norm wordt opgevat als "relevant" is moeilijk te voorspellen. Individuen moeten kunnen identificeren met de onmiddellijke buurt of met demografisch soortgelijke huishoudens.	Enquêtes om de relevante normen te identificeren. Daarna veldstudies in Nederland (gerandomiseerde gecontroleerde trials) met de vastgestelde normen.
Rangschik-king	• Openbare rankschikkingen verhogen pro-sociaal gedrag van individuen in strategische situaties (max. 15% in het lab).	Het actief aanspreken van het (bewuste en onbewuste) zelfbeeld van individuen ('naming and shaming') heeft potentieel grote en blijvende gevolgen. Het kan effectief zijn om kleinere gemeenschappen (bijvoorbeeld buurten, postcodegebieden) in plaats van individuele huishoudens te	Laboratorium onderzoek naar het effect van publieke rangschikking van groepen versus controlegroepen en vergelijking maken met effect van rangschikking van individuen

[2] Schattingen over het effect van de verschillende nudges op energiebesparing lopen sterk uiteen. In de tabel worden gemiddelde effectgroottes gerapporteerd. Hierbij zijn twee uitgangspunten gehanteerd: 1) Daar waar studies grote verschillen in effecten laten zien zijn de gerapporteerde waarden gebaseerd op zo representatief mogelijk onderzoek. 2) Er is voor gekozen om binnen de groep van representatieve studies geen weging aan te brengen, maar de maximaal gevonden gemiddelde effectgroottes te rapporteren. Bevindingen zijn ook van toepassingen voor soortgelijke instrumenten met indirecte feedback.

		rangschikken en deze rangschikkingen regelmatig in de lokale kranten te publiceren.	binnen groepen.
Framing	• Precieze framing (bijvoorbeeld presentatie) van zaken is cruciaal en kan de effectiviteit van de nudge maken of breken. • Afwijking van de norm presenteren als (monetaire) verliezen, zou een positief effect kunnen hebben (nog geen bewijs).	Het effect van feedback informatie is afhankelijk van de precieze presentatie. Het niet bereiken van een doel, of het consumeren van meer dan de norm zou in termen van verliezen kunnen worden meegedeeld, bijv. "U geeft € x per maand meer uit dan het gemiddelde huishouden in uw buurt ".	Enquêtes om de relevante normen te identificeren. Daarna veldstudies in Nederland (gerandomiseerde gecontroleerde trials) met de vastgestelde normen en verschillende manier van framing.

Tabel 2: Belangrijkste relevante bevindingen t.a.v. Slimme Meters met Real-Time Display (RTD)[3]

Relevante nudges	**Resultaten uit het literatuuronderzoek, laboratoriumexperiment, en case studies**	**Openstaande vragen**	**Implicaties voor verder onderzoek**
Informatie feedback	• Installatie van een slimme meter heeft een klein, niet-blijvend effect (max. 5%). • Feedback over energieverbruik via een RTD heeft een positief effect (max. 12%). • Installatie van een slimme meter vermindert klachten van klanten vanwege verbeterde klantenservice.	Consumenten moeten een effect van hun energiebesparing zien op hun energierekening om duurzame effecten te bereiken.	Voor de verdere rol-uit van de slimme meter zou het interessant zijn om te testen wat het effect van een RTD is op energiebesparing. Indien technisch mogelijk, zouden de gevolgen van de opname van een beschrijvende (en bij voorkeur ook beoordelende) sociale norm op de RTD kunnen worden getoetst aan een controlegroep (veldstudie).
Sociale normen	• Communicatie van beschrijvende en beoordelende sociale normen zou een positief effect hebben (nog geen bewijs).	Welke sociale norm wordt opgevat als "relevante" is moeilijk te voorspellen (zie hierboven).	
Framing	• Presentatie van afwijking van de norm als (monetaire of kW) verliezen, zou een positief effect kunnen hebben (nog geen bewijs).	Het effect van feedback informatie is afhankelijk van de precieze presentatie (zie hierboven).	

[3] Schattingen over het effect van de verschillende nudges op energiebesparing lopen sterk uiteen. In de tabel worden gemiddelde effectgroottes gerapporteerd. Hierbij zijn twee uitgangspunten gehanteerd: 1) Daar waar studies grote verschillen in effecten laten zien zijn de gerapporteerde waarden gebaseerd op zo representatief mogelijk onderzoek. 2) Er is voor gekozen om binnen de groep van representatieve studies geen weging aan te brengen, maar de maximaal gevonden gemiddelde effectgroottes te rapporteren. Bevindingen zijn ook van toepassingen voor soortgelijke instrumenten met directe feedback.

Tabel 3: Belangrijkste relevante bevindingen t.a.v. meerjarenafspraken (MJA3-covenant en MEE-convenant)

Relevante duwtjes	Resultaten uit het literatuuronderzoek, laboratorium-experiment, en case studies	Openstaande vragen	Implicaties voor verder onderzoek
Sociale normen	• Beschrijvende en beoordelende sociale normen verhogen pro-sociaal gedrag van individuen in leidinggevende posities (max 45% in het lab).	De resultaten werden verkregen uit het observeren van studenten in leidinggevende posities. De representativiteit van de bevindingen voor de besluitvorming van managers dient te worden bevestigd. Welke sociale norm wordt opgevat als "relevant" voor managers is moeilijk te voorspellen (dezelfde bedrijfstak, vergelijkbaar bedrijfsgrootte, land of regiospecifiek etc.).	Enquête om de relevante normen onder Nederlandse topmanagers te identificeren. Experiment om effecten van beschrijvende en beoordelende sociale normen op de beslissing van managers in simulaties van real-life situaties te testen.
Rangschik-king	• Openbare rangschikkingen verhogen pro-sociaal gedrag van individuen in leidinggevende posities (max 40% in het lab).	De resultaten werden verkregen uit het observeren van studenten in leidinggevende posities, de representativiteit van de bevindingen voor de besluitvorming van managers te maken dient te worden bevestigd.	Experiment om effecten van de openbare rangschikking op de beslissing van managers in simulaties te testen.
Verant-woording	• Terugkerende (schriftelijke) verantwoording van beslissingen met betrekking tot een sociale norm kan positieve effecten hebben (nog geen duidelijk bewijs).	De resultaten werden geobserveerd in een situatie waarin verantwoording werd gecombineerd met een sociale norm. Het is niet duidelijk in hoeverre verantwoording alleen een effect heeft. Onder de voorwaarde dat de resultaten ook gelden voor de besluitvorming van managers is het wenselijk dat Energie-efficiëntie hoog op de agenda van bestuurders staat. Waarschijnlijk kan een mondelinge verantwoording voor hooggeplaatste beleidsmakers dit effect reeds bewerkstelligen. Het is onduidelijk waar in het proces van de ondertekening van MJA3-convenant en MEE-convenant deze interventie zinvol en haalbaar zou zijn.	Laboratorium onderzoek naar het effect van verantwoording door managers vs verantwoording door individuen.
Commit-ment en het stellen van doelen	• Het publiek bindende karakter van MJA3- en MEE-convenant heeft eerste positieve effecten (nog geen systematisch bewijs).		De analyse van de gegevens verkregen uit verslagen van de ondernemingen over de eerste MJA's in vergelijking met een (eventueel buitenlandse) controlegroep zal inzichten geven over het besparingspotentieel in Nederland.

1. Introduction

Since 1960 the energy consumption per person in the Netherlands has risen from 1.826 kg of oil equivalent per capita (KG) per year to 5.021 KG in 2010 with a small reduction to 4.646 KG a person in 2011 (World Bank, 2013). The overall increase in the use of energy can be explained by technological developments, economic growth and cultural developments (Gatersleben & Vlek, 1998). Most of the energy in households is used for heating the house, warm water and air-conditioning. Since the energy crisis in the early 1970s and increasing concerns about global warming and resulting environmental, economic and social problems, a growing body of research is investigating how to reduce energy consumption.

"To combat climate change, many economists and policymakers advocate price-based approaches, such as greenhouse gas emissions taxes and emissions trading programs, or technology-based approaches, such as R&D subsidies and public-private R&D partnerships. In the end, however, both types of approaches rely on consumers and firms to make different choices: they will need to change what they do. […] A recently-growing body of research in psychology and behavioural economics suggests that *non-price* interventions can be just as powerful as prices in changing consumer choices. These behavioural approaches, which include commitment devices, information provision or attentional devices, appeals to social norms, or apparently-small changes to prices, default options, or transactions costs, are quite inexpensive and can be extremely powerful." (Allcott & Mullainathan, 2010: 1).

Energy efficiency is not only extremely relevant from a policy perspective, but also highlights that nudging[4] people towards (more) socially-desirable Behavior is difficult, even in the presence of private incentives: Policymakers have encountered substantial difficulties over the past three decades trying to induce people to change energy consumption behaviours and adopt new, more energy-efficient technologies, even when these behaviours appear to be in the energy consumers' own financial interests. Actual penetration of energy efficient technologies and behaviours have remained strikingly low, "a phenomenon that has been alternately dubbed the "Energy Efficiency Gap" and the "Energy Paradox" (Jaffe & Stavins 1994). This suggests that prices and technology may not be the only barriers to increased energy efficiency" (Allcott & Mullainathan, 2010: 1).

More generally, and beyond the field of energy (efficiency), governments and governmental agencies are regularly confronted with the question of how to effectively (achieving the desired behaviour) and efficiently (at the lowest feasible cost) influence the behaviour of the private and corporate citizens. Situations in which private and collective rationality diverge abound: Current taxpayers need to be persuaded to forego

[4] Nudging refers to subtly pushing individuals to alter their choices and behavior in response to changes in factors other than actual (monetary) incentives (e.g., a set of options as the incentives; and they way in which they are *displayed* as the nudge) (Thaler & Sunstein, 2008: 9).

current consumption for the sake of future generations. Frequently, more and less sustainable technological solutions exist (e.g., more and less efficient consumer appliances, building isolation in housing construction, and so on). Consumers frequently opt for the cheaper but less sustainable alternative. A standard approach of policymakers to encourage consumers to opt for the socially desirable alternative involves monetary incentives such as subsidies. However, these instruments are not only costly, prompting questions about their *efficiency*, but—as the "Energy Paradox" illustrates—, even though they are costly, they are not always *effective* either, i.e. often the desired policymaking objectives are not (fully) achieved. One presumable core reason lies in the fact that individuals decide as "Humans" rather than as "Econs" (Thaler & Sunstein, 2008): While "Econs" may not be able to make perfect forecasts, they at least make unbiased forecasts, that is, their forecasts may be wrong, but not systematically so in any predictable manner. And they respond primarily to incentives—their decisions are not affected by seemingly "irrelevant" factors such as the display of a set of alternatives, the order in which options are offered, and so on. In contrast, "Humans" make systematic and predictable errors—their forecasts are flawed and biased in systematic ways. For example, people tend to suffer from the so-called "status-quo" bias—a strong tendency to stick to the status quo and go along with a default option, even if an alternative option exists that would offer superior benefits for them (Thaler & Sunstein, 2008). In response, a growing body of research has been undertaken over the past decades, often in the form of partnerships between behavioural scientists and partner organizations, such as, for example, governments, NGOs, and private sector businesses. Together, these studies have generated important insights into the effects of non-price interventions, and have yielded increasingly compelling results, pointing towards both behavioural effectiveness and favourable cost efficiency of such non-price interventions (Allcott & Mullainathan, 2010).

Taking into account these insights into the reality of human decision-making, is an important challenge for today's policymakers. Are there `cheaper´, more efficient and possibly as well more effective, non-financial ways of influencing the behaviour of private and corporate citizens, nudging them towards socially desired choices, for example, in the domain of energy consumption? Can such mechanisms complement or substitute for monetary incentives in fostering sustainable decision-making in policy relevant areas such as energy consumption? If so, what mechanisms might be feasible to implement in actual policymaking? Against this background, the Dutch Ministry of Economic Affairs (Ministerie van Economische Zaken, henceforth EZ) wants to know which "nudges" are the most suitable for application in the field of energy conservation. To this end, it is necessary to

(1) take stock what is known about the effects of non-monetary incentives in general, and legacy reminders in particular, in increasing individuals' regard for collective interests and for intergenerational beneficence, in particular in the domain of energy consumption (literature review);
(2) investigate in a laboratory setting the effects of selected non-monetary incentives on a selection of relevant decision tasks (laboratory experiments).

(3) Applying the insights from the literature review and laboratory experiments to specific instruments of policy-making in the Netherlands.

2. Overview of the Current project

2.1 Contribution of the Current Project

Against the sketched background, the current project builds on and extends prior research in several ways.

First, we improve upon existing studies by taking stock of the current state-of-the-art in the field and, on that basis, suggest and test ways in which nudges that have shown or argued to be promising can be further improved upon in their effectiveness. In so doing, we focus specifically on the energy sector and are able to tailor the experimental design specifically to the conditions that prevail in the Dutch energy sector and to the interests of EZ.

Second, we incorporate new insights from recent psychological research that have not been analysed in this domain. Specifically, we explore the effects of a novel, potentially powerful type of nudge that has been shown to influence pro-social behaviour in other domains (e.g., charity giving), that is, legacy reminders. Recent research on personality and life-span development psychology suggests that it is possible to increase individuals' regard for collective interests and for intergenerational beneficence by reminding them of their inherent desire to generate a positive legacy (hence the term "legacy reminders" for such nudges; Wade-Benzoni et al., 2012). "Acting on the behalf of future generations can paradoxically represent a dramatic form of self-interest—immortality striving," Wade-Benzoni et al. explain. "Believing that we have made a difference by leaving a group, an organization, a professional field, or the world a better place helps us to gain a sense of purpose in our lives and buffer the threat of meaninglessness posed by death." To date, the effects of legacy reminders in the field of energy conservation have not been analysed, although forms of legacy reminders have been used (presumably successfully) in commercial advertising for years (e.g., watchmaker Patek Phillipe).

Third, we emphasize the behaviour of individuals that are in a "managerial" position. While the decisions of individuals in managerial positions are of substantial relevance for modern societies and, consequently, policy-making, research into the specific decision-making of managers and how it is influenced by nudges is severely under-developed, compared to the decision-making of individuals in private positions. Specifically, most of the extant research in both psychology and (behavioural) economics on how to "nudge" individuals into the adoption of pro-social and/or energy efficient behaviour has focused on private consumers. Consumers without any doubt constitute a key target group of policymakers that aim for energy conservation. Abrahamse et al. (2005), for example, report that in the U.S., in 2003, private households were responsible for an estimated

1214.8 million metric tons (MMT) of U.S. energy-related CO2-emissions (equivalent to 21% of the total). They further argue that OECD figures on households' contributions to total energy use generally range between 15% and 20% (Biesiot & Noorman, 1999). At the same time, these figures suggest not only that private households are an important target group, but also, that organizations, including private firms, are crucially important as well, both in their capacities as users of energy (the focus of this study) and as producers of energy. Managers, as decision-makers and representatives of these firms, therefore, represent an important target group as well—one that, however, has received comparatively little research attention. Can the responses of private households to behavioural interventions be viewed as similarly representative of the decisions that managers might take in response to the same nudges? This is unlikely. What distinguishes at the core individuals who take decisions for their private households and individuals who decide in their capacity as managers is that the latter persons need to justify their decisions. Line managers have to justify their purchasing decision of new production equipment vis-à-vis their superiors; top managers and Chief Executive Officers (CEO) must justify their decisions vis-à-vis shareholders (for example, to accept lower profits due to investments in more environmentally-friendly production technologies, or to invest in energy saving measures despite the risk of substantial disruptions to the production process).[5] How does being forced to formally justify their decisions change the effectiveness of various nudges? What about the role of publicity, in particular in relation to personal reputation and firm reputation? While prior evidence on factors that induce firms to increase their investments in Corporate Social Responsibility (CSR) suggests that publicity pays a key role, for example, in the form of public rankings ("naming and shaming"), the evidence remains patchy (cf. Abrahamse et al., 2005) and we lack systematic insights, especially compared to insights gained from prior research on private households' decisions as energy consumers.

Overall, what benefits can supposedly be reaped from governmental intervention in private households' as well as firms' energy consumption choices? Anecdotal evidence suggests that the potential for increasing energy efficiency is substantial. For example, during the California energy crisis in the 2000s, consumers managed to reduce their electricity usage by 13% in response to large price increases (Allcott & Mullainathan, 2010; Reiss & White 2008), suggesting that, given the "right" incentives, consumers might indeed be able to economize substantially on their energy use.[6]

[5] Recent studies reveal that the more visible actions, the more accountable managers feel for their actions, and the more they will try to increase firm value to build a good reputation. This leads to decisions that are better aligned with shareholders' interests. Hence, one way to align the objectives of top managers with those of shareholders is to define their responsibilities in a way that maximizes their visibility. Legitimate power determines how much effect a manager can have on firm performance. Powerful managers make decisions that have a potentially large impact on firm performance. Individuals with higher power are more optimistic in their assessments of risks (Magee & Galinsky, 2008).

[6] Generally, behaviors related to energy conservation can be divided into two categories: efficiency and curtailment behaviors (Abrahamse et al., 2005: Gardner & Stern, 2002). Efficiency behaviors are one-shot behaviors and entail the purchase of energy-efficient appliances, devices, and materials, such as insulation. Curtailment behaviors involve repetitive efforts to reduce energy use, such as simple changes in routines and habits, or infrequent and low-cost energy stocktaking behaviors (changes in habits and lifestyles i.e., replacing incandescent bulbs with CFLs, weather stripping). To date, most studies into household behavior

2.2 Research Approach of the Current Project

The current research project adopted a two-fold approach to improving upon existing knowledge in the field of nudging individuals towards pro-social behaviour and, in particular, towards energy conservation.

First, we took stock of the current state-of-the-art in the field by performing an extensive literature review of relevant theoretical literature, related experimental studies, and empirical studies using field data, in particular related to pro-social behaviour in the energy domain. While a summary of the main findings is presented in the next section, the detailed review can be found in Appendix A.

Second, based on this extensive literature review, we developed and tested ways in which nudges that have shown (or argued) to be (potentially) promising could be further *improved upon in their effectiveness (e.g., combination of nudges)*, the results are described in detail in Appendix B. This analysis was based on the development of a novel experimental design in which a selection of nudges (partly in combination) was administered in a laboratory (lab) setting. Novel aspects of the design were

- the focus on comparing decisions of individuals in managerial positions with those of individuals in private settings,
- the analysis of newly developed nudges such as positive legacy reminders, and
- the comparison of these novel features with established findings, giving rise to the identification of important future research issues (e.g., investigation of context-specific effectiveness of nudges for example for strategic vs. non-strategic energy conservation settings).

in particular have either not distinguished between the two or aimed at both efficiency and/or curtailment behaviors. We follow the lead of these researchers and, for this exploratory study, do not explicitly distinguish between both types of behavior, among others, because the experimental settings suggested here aim at capturing rather fundamental behavioral responses to the analyzed nudges. However, future field experiments might want to explicitly account for such subtle distinctions. First, the energy-saving potential of efficiency behaviors has been estimated to exceed that of curtailment behaviors (e.g. Gardner & Stern, 2002). For example, it has been argued that households may save more energy by properly insulating their homes than by lowering thermostat settings. On the other hand, prior research also suggests that energy-efficient appliances do not necessarily result in a reduction of overall energy consumption if people use these appliances more often ("rebound effect; e.g., Berkhout, Muskens, & Veldhuijsen, 2000). Second, efficiency behaviors require much less behavioral persistence ex post but tend to be associated with much greater behavioral inertia *ex ante*. As such, in the field, differential effectiveness of nudges may emerge for both types of behaviors.

Experimental economics *seeks to control causative factors in order to provide better ceteris paribus comparisons between situations. In addition to testing the predictions and underlying assumptions of economic theory, experimental economics is also more and more used to test-bed institutions and environments implementable as policies. The aim is to create a controlled economic environment, and to observe individual economic agents together with an institution through which they interact*[7]*. In doing so, experiments can serve as a first step towards evidence-based policymaking. While laboratory experiments allow for identifying the direction and relative strength of effects of specific nudges, a solid understanding of the size of these effects is only possible by conducting adequate field studies.*

The current study focused on the general context of 'sustainable decisions', i.e. individual or firm decisions that have an impact on the environment. More specifically, we consider energy saving as a consumption decision. The underlying assumption is that this decision imposes an externality on society, and that the decision maker needs to be incentivized to internalize this externality such that decision making comes closer to the social optimum. The main research question of the laboratory study is therefore how and to what extent non-monetary incentives can be used to 'nudge' decision makers towards the internalization of externalities. The results of this laboratory study, therefore, can serve as a first step towards building up the necessary foundations for running tailor-made field studies, if desired.

Existing research gives no clear indication about the reasons *why* people do not change energy consumption behaviours and adopt new, more energy-efficient technologies, even when these behaviours appear to be in the energy consumers' own financial interests ("Energy Paradox"). Obviously, one possible reason is that people misperceive monetary and non-monetary costs and benefits. However, prior research suggests that further reasons exist and may vary depending on whether the decision setting is a non-strategic or a strategic context.

In a *non-strategic* context, an individual's decision balances private costs (disutility of less energy, monetary expenditure for CO2 certificates, investment costs for installing insulation, non-monetary disutility) against private benefits (lower energy expenditures, non-monetary utility from positive self-image, 'warm glow'). The individual's own decision and outcomes from this decision are independent of the decisions of others.

[7] To guarantee internal validity of the findings, the experimental design has to fulfill the following criteria: the environment (preferences, technology, and initial endowments, rewards), the institution (rules of the game, e.g. possible actions, sequence of actions, information conditions, framing (language, story)); and the conditions under which evidence is generated (evidence is replicable) need to be controlled. Any confounding effects need to be avoided in order to sharpen the effects of focus variables, to minimize blurring due to nuisance variables (boredom, experimenter demand effect), and to allow to disentangle the effects of different variables. Participants may not be deceived, i.e. there is no deviation from announced relations between actions and rewards, and no 'tricks'.

However, the decision still carries a positive externality (social benefits). The socially optimal decision considers social benefits, thus would lead to a higher level of energy savings. In non-strategic contexts, therefore, factors explaining why energy consumers fail to engage sufficiently in energy conservation (even if it would be in their own financial interest) include as well inconsistent time preferences. Consequently, in the current experiment, we tested in a non-strategic setting two nudges that address individuals' assessment of costs and benefits *across time*, namely:

- legacy reminders (both positive and negative), and
- commitment.[8]

In a *strategic* context an individual's decision balances private costs against private benefits and additionally takes the decisions of others strategically into account. The decision can be understood as a social dilemma (cooperation problem) in which the individual's endowment can be used for private consumption or for providing the public good (positive externality). Hence, an individual's decision and outcome from this decision depends on the decisions of others. The optimal decision can be described as the Nash equilibrium. As marginal private benefits are smaller than marginal social benefits, in equilibrium there is insufficient provision of the public good. In strategic contexts, therefore, reasons for why energy consumers fail to engage sufficiently in energy conservation (even if it would be in their own financial interest) include as well their neglect of collective interests (free-riding). Consequently, in the current experiment, we tested in a strategic setting two nudges that address individuals' *concern for collective interests*, namely:

- social norms as reference points,
- ranking (a kind of refinement of the basic social norm nudge combined with public visibility in order to appeal to status and self-image concerns).[9]

The overall set-up of the experiment is described in more detail in Appendix B.

2. 3 Summary of Results of the Current Project

2.3.1 Results from the Literature Review

In the following, we provide a concise overview of some of the major areas of research in the field and the corresponding results. The discussion of more fundamental literature relevant to the study is presented in Appendix A. Note that we do not aim to exhaustively present a literature review, but rather to convey key insights that are most relevant for the current research project, i.e. that concern the domain of energy consumption and

[8] Both of these types of nudges are administered to participants that act purely on their own behalves in the position of individuals.

[9] Both of these types of nudges are administered, first, to participants that act purely on their own behalves in the position of individuals; and, second, to participants that act in a managerial position ('managers').

conservation.[10] This literature summary is structured by the various "nudges" that are suggested in the literature.

Commitment devices

Research in psychology and economics indicate that humans procrastinate, that is: they put off actions today that in the long run they know would be good for them, such as exercising, eating healthfully, saving for retirement (for a concise overview, see, Appendices A.2, A.4.1, and A.5.1 and e.g., Allcott & Mullainathan, 2010). Since "tomorrow" is always a day in the future, procrastination may cause individuals to indefinitely delay actions or investments that yesterday they said they wanted to undertake today. Therefore, "commitment devices" are interventions that allow individuals to "lock" themselves *today* into the action that they want to take *tomorrow*. According to Abrahamse et al. (2005), a commitment is an oral or written pledge or promise to change behaviour (e.g. to conserve energy), which is often linked to a specific goal, for instance, to reduce energy use by 5%. This promise can be a pledge to oneself, in which case it may activate a personal norm (i.e. a moral obligation) to conserve energy. The promise can also be made public, for instance, by means of an announcement in the local newspaper or on a website. Then, social norms (i.e. expectations of others) may play a role as determinants of conservation behaviour (see also the sub-section below on social norms).

Most of the work by economists on commitment devices has focused on individuals' savings decisions and health-related behaviours, but the phenomenon is no less relevant in the energy domain. The following situations provide some examples: Can individuals be induced to commit to reducing energy consumption or to engage in energy-saving investments and then stick to these commitments, for example, stick to a commitment to invest in solar panels or insulation of their home within a specific time period; stick to a commitment to use less energy by e.g. turning down the heat or shift consumption out of peak time, stick to a commitment to buy compensation for CO_2 generation when booking their next flight? In an early study, Pallak and Cummings (1976) used commitment to promote gas and electricity conservation among households. Those who had signed a public commitment (i.e. publication in a leaflet) showed a lower rate of increase in both gas and electricity consumption than those in either the private commitment or the control group. This effect was maintained over a period of 6 months following discontinuation of the intervention.

This early study highlights an important element of the effectiveness of goal setting and commitment devices (Houde & Todd, 2011): the degree to which the goal-setting or commitment is publicly visible (see also below the section on self-image and status). Furthermore it should be noted that a commitment may also take the form of "escalating commitment": engaging people (small) step by step into a series of energy-conserving behaviours tends to work better then requiring them to make one large "jump". One of

[10] Additional evidence that might be relevant for the energy domain comes also from other areas of application, and is presented in Appendix A.

the reasons for this may be related to habit formation. To the extent that energy efficient behaviours can become part of habitual behaviours, they are likely to be more persistent, even after the (monetary or non-monetary) incentive has ended (Houde & Todd, 2011).

In a 1982 study of daily/weekly feedback by Winett et al. (1982), 82 Virginia households participated in a study of household energy conservation. Participants in the four treatment groups were given specific instructions on turning back their thermostat. They were also given a 15% reduction goal and asked to sign a form indicating their commitment to work toward this goal. Although the study does not explicitly test for the effects of goal setting, the approach was successful in generating overall energy savings of 17%.

Lockhorst et al. (2011) present the results of a meta-analysis on 19 studies on the effects of commitment alone and commitment plus another treatment (e.g., feedback, incentives, persuasive messages) on general pro-environmental behaviour of individuals, of households, or of employees in firms. The overall pattern of results suggests that during the intervention period, both commitment alone and in combination with another treatment yield moderate and reliable effects relative to control conditions. With respect to the question whether commitment or commitment plus another intervention led to long-term behaviour change, relative to control conditions, their results show that both commitment only and commitment plus another treatment yielded sustained behaviour change.

Allcott and Mullainathan (2010) argue that studies from economics, psychology, and other fields have consistently shown that there can be a wide gap between implementation intention and action. In experimental settings, it is often relatively easy to change people's attitudes, for example regarding whether they should visit the health centre for a check-up, but much more difficult to get them to follow through and actually change their behaviour. In the energy domain, consumers are reported consistently to say that they are interested in buying energy efficient products and engage in energy-conscious behaviours. Their actual behaviour, however, sometimes does not reflect their stated goals. It is not yet clear, how much of this gap can be addressed by, e.g. programs that encourage people to actually map out how they plan to go get that new air conditioner. Field studies in domains such as healthcare have, however, shown that careful implementation of commitment nudges can address such concerns, at least to some extent. For example, linking the formulation of goals and the statement of commitments to the incurrence of substantial costs ("stakes") has been shown to raise the likelihood that people will actually follow through with their commitments. Blumenthal-Barby and Hadley Burroughs (2012), for example, refer in particular to a current trend in healthcare, that is, websites (e.g., www.stickk.com) that allow users to commit themselves to achieving certain goals (e.g., losing weight). Failure to achieve this goal after a pre-specified time period, as assessed by an ex-ante nominated third party, has real financial consequences.

Default options[11]

Pichert and Katsikopolous (2008) define a default as "the condition that is imposed when an individual fails to make a decision (Johnson & Goldstein, 2003) or the option that consumers receive if they do not explicitly request something different (Brown & Krishna, 2004)" (p. 65). People rarely switch away from the option that requires no action, for example, when choosing a retirement savings plan or a retail electricity provider. Sticking to the "default option" represents a frequently observed and strong inertia behaviour (Thaler and Sunstein (2008)). Underlying possible reasons, which are not necessarily mutually exclusive, are procrastination (people intend to change behaviour tomorrow but never do), the "endowment effect" (people come to prefer whatever option they currently have), or (switching) costs of changing options (including mental effort), or lack of information on the benefits of such a change. Because agents' inertia keep them on the default option, an effort by the "choice architect" to set this default to an individual or social optimum instead of some less desirable choice can dramatically improve welfare. There appears to be substantial scope for making use of this powerful inertia by cleverly designing default options in the energy field as well. In many domains, for example, the default option is not the most environmentally-friendly one. Factory settings on phones and laptops are typically not the most energy-conserving mode. When buying a plane ticket online, a passenger must check an extra box to purchase carbon offsets, instead of unchecking a pre-checked box. Similarly, default settings of household appliances may be subjected to environmentally-friendly regulation. McCalley (2006), for example, estimated that setting the default temperature on washing machines to "cold" could save up to 24% in terms of total amount of energy used (averaged in his study over 20 washing trials), compared to regular machine settings, in which temperature default settings higher than cold are assigned to each washing program by the manufacturer.

In a set of four studies (two natural experiments and two laboratory experiments), Pichert and Katsikopoulos (2008) found a strong effect of information presentation format, specifically of the default used, on the choice of electricity provider. In one study, participants were asked—in a hypothetical scenario— to choose between two electricity suppliers: one advertising 'clean electricity' generated from environmentally benign renewable energy sources, and another offering a more economically priced tariff, but providing no information on the origin of the electricity. Three treatment conditions were administered: "green", i.e. the green utility served as the default, and the grey one was the competitor; "grey", i.e., roles were reversed; "neutral", i.e., neither of the utilities was the set as default. In the grey condition, 31 of 75 participants (41%) chose the green (non-default) supplier; in the green condition, 52 of 77 participants (68%) opted for the green (default) supplier. When the two options were presented in a neutral format (no default), 67% of subjects opted for the green provider. It seems that while the grey condition hurt green choices, the green condition did not actually lift it above the neutral benchmark level. Finally, Ehrhardt-Martinez, Donnelly, and Laitner (2010) report that household participation rates are significantly higher for advanced metering and residential feedback programs that are explicitly designed as opt-out programs in which opt-in serves as the

[11] For more details on the general literature on default options, see Appendix A.6.

default, and opt-out requires an active and deliberate choice by the consumer against the default.

Information and Feedback

Behavioural changes are positively associated with the provision of a limited amount of relevant and targeted information, and specific and timely feedback. As for the provision of information, it is important to note that the information should not only be relevant with respect to the behavioural changes in question. It should also, perhaps counter intuitively, be limited. An overload (of information and options) has been shown to induce people to abstain from acting, rather than lead them to make a change.[12] As for feedback, to have the desired (positive) effect, research has shown that it needs to be specific and timely.

The Energy Demand Research Project (EDRP), conducted by AECOM Building Engineering and Ofgem (AECOM Building Engineering and Ofgem, June 2011), was a major project in U.K. with the aim of testing consumers' responses to different forms of information and feedback about their energy use. For this project, four energy providers each conducted trials of the impacts of various interventions (individually or in combination) between 2007 and 2010. The interventions used were primarily directed at stimulating energy conservation. A minority of the interventions also aimed at shifting use from peak to off-peak periods. The project involved in total over 60,000 households, including 18,000 households that were equipped with smart meters. Measures were generally applied at the household level. One energy provider also tested action at community level. The main findings from this report suggest that the effects of energy conservation advice (information) as such were observed only in some cases. When they were observed, they were associated with reductions in annual energy consumption of up to 5%. Information on energy conservation was most effective when provided in simple, short statements, and (repeatedly) over a period of time—minimal information provision but well-presented and easy to absorb a little each month. Therefore, the authors of the report conclude that "advice should be provided but the details of delivery (e.g. clarity, quantity of information, timing) and combination with other interventions, are critical" (p. 167). The same essentially applied to the provision of historic usage feedback.

Most relevant in this context is a study by Ehrhardt-Martinez et al. (2010). Their study explicitly focuses on advanced metering initiatives and residential feedback programs and constitutes the most comprehensive, closely related analysis of relevant issues in this domain.[13] Specifically, they present a meta-review of 57 primary studies into household

[12] In a non-energy related context, Iyengar and Lepper (2000), for example, showed that when consumers in a grocery store were presented with a limited display of six jams to test and taste, 12% of them actually bought a jam afterwards. However, when they were confronted with an extensive array of 24 jams to test, only 2% of the customers actually bought one a jam. In both cases, the number of jams that they could choose from for making the purchase was the same (24).

[13] Their meta-review explores the effects of a variety of variables associated with temporal and regional context as well as various program design characteristics with the goal of providing preliminary insights as

electricity-saving in response to various types of feedback performed over the course of the past 36 years in nine countries including the U.S., Canada, Australia, Japan, and European countries.

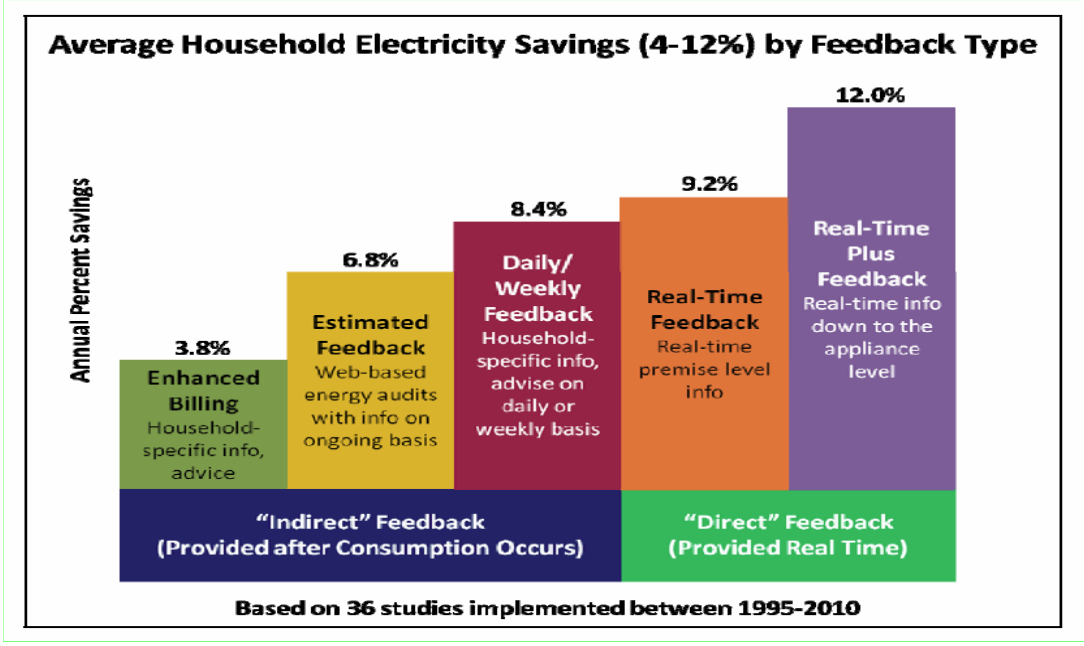

Figure 1: Average household electricity savings by feedback type—Results of a meta-review based on 36 studies implemented between 1995-2010 (source: Ehrhardt-Martinez et al., 2010)

Overall, they find that significant savings can be achieved, but also that future research is sorely needed. The key message from their meta-analysis is that the type of feedback matters crucially. Some forms of feedback appear to be much more effective than others in generating more substantial energy savings. In particular, the frequency and richness of the feedback seem important: daily/weekly feedback and real-time plus feedback ("plus" meaning that additional useful information on energy consumption is provided, rather than only total usage figures) tend to generate the highest savings per household. Further, they suggest that, indeed, most of the energy savings from feedback programs result from changes in behaviours, that is, from stimulating curtailment, rather than from encouraging investments in energy efficiency (although people who invest more also tend to save more energy).

In a field experiment, involving 1,743 US households, Houde et al. (2013) investigated the impact of providing real-time whole-home electricity consumption feedback to households. The feedback technology used in their study was a monitoring device that recorded electricity consumption, combined with a web application that graphically displayed consumption information in near real-time (information was updated every ten minutes) as well as other related energy information such as cost and comparative use. The specific feedback technology used consisted of a hardware device that allowed the

to the ways in which and the degree to which different factors are likely to influence feedback-induced energy savings" (Ehrhardt-Martinez et al. (2010): iv).

display of ten minute interval electricity consumption data. The data were provided to the households via a web interface developed by Google, a large California-based IT company, and called Google Powermeter. The main feedback feature of the interface was a graph that presented the ten minute interval and historical electricity consumption data.[14]

The largest reductions in energy consumption were initially observed at all times of the day. Later on during the study this pattern shifted and morning and evening intervals showed larger reductions. Interestingly, the results appear largely unaffected by individual household characteristics such as demographics, housing characteristics and psychological variables. This is in line with prior studies that have also found that observable variables (e.g., household demographics) tend to poorly predict heterogeneity in energy savings from feedback (e.g. Davis 2011). Overall, Houde et al. (2013) conclude that on the one hand, households responded significantly to feedback and were able to reduce electricity usage, indicating quite some scope for changing habits and behaviour (curtailment) and inducing investments in more energy-efficient appliances (efficiency). On the other hand, the primary challenge appeared to be to prevent these reductions from weakening with time.

Social norms

Social comparison theory (Festinger, 1954), suggests that people use a set of standards to evaluate reality and to evaluate themselves. First they rely on objective or non-social standards. Second, people compare themselves to others, especially when an objective standard is not available or is not perceived as relevant. For more details see Appendix A.5.2. For a norm to be defined as a social norm, it must be shared by others and sustained by their approval (Elster, 1989). Norms are maintained by the unwanted emotions (guilt, embarrassment, shame) an individual feels when he/she is not complying with them. An individual's need to belong to a social group and be accepted by it (Baumeister & Leary, 1995) makes heeding social norms particularly important (Meek et al. 2010). Observing what others do can, therefore, strongly affect individuals' actions by influencing what they perceive to constitute appropriate behaviour in a given situation.

Various mechanisms may underlie individuals' adherence to social norms (Allcott & Mullainathan, 2010). They may conform to others' behaviour because they believe in the wisdom of crowds, i.e. that others took an action because they had more or different information about its benefits. Or they may perceive that there is some external approbation or inner comfort from conformity. In a recent study, Goldstein et al. (2008), partnered with a hotel in Phoenix, Arizona, to induce guests to reuse their towels. The researchers tried several different messages: "Save the Environment," "Preserve Resources for the Future," "Partner with the Hotel to Save the Environment," and "Join

[14] The interface also had a number of additional features, such as, for example, (1) an annual electricity budget tracker, (2) a forecast of the annual electricity bill, (3) a display of total daily kWb, (4) an estimate of the base load consumption, (5) a comparison at the day level of current consumption to past consumption, (7) a link to a web page with energy conservation tips, and (8) an email reminder.

Your Fellow Citizens in Helping to Save the Environment." The final card which included the information that the majority of hotel guests do reuse towels, i.e. that conservation was the social norm, yielded a significantly higher towel reuse rate (44.1%) than the environmental protection conditions (35.1%).

Studies by Nolan et al. (2008) and Schultz et al. (2007) found that the use of social norms resulted in household energy savings of 5.7–10% and that the use of both descriptive and injunctive norms was important in shaping household energy behaviours. Descriptive norms capture people's perceptions of what is *commonly* done in a particular situation, whereas injunctive norms entail a prescriptive connotation, that is, a perception of what behaviour is approved upon by the majority of peers in a particular situation, i.e. how one *should* behave.

Dolan and Metcalfe (2013) analysed the results of two natural field experiments (NFEs) in the U.K. In their first study, Dolan and Metcalfe (2013) used daily energy consumption from a natural field experiment during 2010-2012, in which 569 households were randomized them into three groups: (i) a control group which received a normal, basic energy statement; (ii) a treatment 1-group which received additionally information about social norms (average consumption of peer group); (iii) a treatment 2-group which received additionally information about social norms as well as further information about how to save energy.[15] Dolan and Metcalfe (2013) began their study by reading the energy (gas) meters in October 2010. Their consumption data (per day) stretch until March 2012. The first intervention took place in December 2010 (high energy season), the second one in June 2011 (low energy season), and the third one in January 2012 (high energy season). For each intervention time period the treatments were identical and the households remained in the same groups for the whole study period. This first study yielded the following results: First, both treatment groups reduced their energy consumption, compared to the control group. Second, after the first intervention, the effect size of this reduction in the treatment 2-group (social norms with information) was twice as large as the effect size in the treatment 1-group which received social norm feedback only. However, over time, the "social norms-only" group (treatment 1) caught up: Over a period of 15 months, both treatments groups had the same lasting effect in terms of changing energy behaviour. Interestingly, the social norm treatment had an immediate effect on behaviour. The first day that people received the feedback was the day with the largest per day behavioural change. This suggests that while social norms might decay over time, they require little learning or sinking in—they seem to be an instant 'attention grabber'. Fourth, those who were above the social norm were more likely to change their behaviour than those below the social norm. For their second study, Dolan and Metcalfe (2013) used monthly energy consumption involving 2,142 private households over a four-month period during 2012. These households were energy customers of a firm called First Utility in the U.K. that were used to receiving billing information by email.

[15] The treatment 1-group received the basic energy statement plus a bar graph illustrating their consumption in comparison to the average in their neighborhood for their property size (referred to as a 'descriptive' social norm). The treatment 2-group furthermore received basic information demonstrating how to change behavior to increase energy-relevant knowledge on the back of the statement.

Households were randomized into one of eight groups: (i) control; (ii) online (i.e. email) social norm; (iii) offline (i.e. letter) social norm; (iv) high-user frame (online); (v) high-user frame with social norm (online); (vi) social norm and $10 incentive for reaching an exogenous target (online); (vii) social norm and $100 incentive for reaching an exogenous target (online); (viii) $100 incentive for reaching an exogenous target (online). Results indicate, first, that offline social norms worked better than online social norms, even though customers in this study were used to information being delivered online. Second, the employed basic monetary rewards (given online) had a large effect on reducing energy consumption both in the two-month treatment period, and the two-month post treatment period. Third, the interaction of social norms with basic monetary incentives had no effect on energy consumption. This suggests that there may be a crowding out effect of placing social norms in the same frame as financial incentives, in that they are not complementary and can even backfire. Fourth, providing online information stating that consumers were inefficient users of energy had no impact on energy behaviour.

Recent psychological research highlights the role that a specific type of social norm might play in stimulating pro-social behaviour, that is, legacy concerns. Legacy norms and the concerns about them are a form of social norm that extends the group of social "peers" to future generations that evaluate an individual (see Appendix A.4.4 for more details). Wade-Benzoni, Tost, Hernandez & Larrick (2012) conducted two experiments to test the relationship between mortality salience, legacy, and pro-social behaviour. In the first experiment, they demonstrated that those participants primed with a negative legacy reminder (death anxiety) behaved more pro-socially towards future generations than those participants in the control condition. Moreover, participants who were primed with negative legacy reminders displayed more generosity towards others in the future than towards others in the present. In a second experiment, Wade-Benzoni et al. (2012) set up a scenario in which participants had to attribute resources to either themselves in the present, themselves in the future, another person in the present or another person in the future. Again, those participants who were primed with the negative legacy reminder were nicer to future others (i.e. they attributed more resources) than to other groups. In these experiments, negative legacy reminders (death priming) consistently led to more beneficence towards others in the future, implying that indeed death priming activates a form of concern for the future (and leave a legacy) and that people therefore spend more resources on those in the future than others now. While little is known to date about the effects of such legacy concerns on energy use behaviour, successful marketing campaigns in the private sector have been making use of this potentially very powerful type of cue for quite some time (e.g., luxury watches by Patek Philippe).

Framing

Whichever nudge is chosen, ample evidence from psychology and behavioural economics has shown that framing can play a key role in influencing behaviour.[16] Framing can make the difference between significance and non-significance and, for significant effects, can

[16] See Appendices A.1 and A.6 for more details.

have a great impact on effect size (consider, e.g., the dramatic differences in effect of the different messages tried by Goldstein et al. (2008) in their study of hotel guests' reuse of towels). Framing effects derive, for example, from people' loss aversion, and their use of mental accounts (for a detailed overview, see Houde & Todd, 2011). Specifically, ***loss aversion*** implies that people tend to focus more on losses than on equally large gains ("losses loom larger"). Prior studies found, for example, that placing a decision either in a positive frame (gain) or in a negative frame (loss) changed decisions by up to 26% (e.g., Tversky & Kahneman, 1981; Haude & Todd, 2011). The use of ***mental accounts*** implies that people tend to have a separate budget for various types of goods and services (e.g., food, clothing, energy) (Houde & Todd, 2011). In the energy domain, Houde and Todd (2011) suggest that people's use of mental accounts could be used in order to foster energy conservation. This could be achieved by framing costs for investing in energy conservation measures as included in other, larger costs that people have to incur anyway. For example, if a private household already incurs substantial costs for a retrofit (e.g., €100,000), suggesting that they add another €100 to the overall bill for (new) compact fluorescent lamps (CFLs), has a greater chance of succeeding than suggesting this minor investment separately and on its own. Furthermore, the choice of specific reference points has been shown to have powerful framing effects (Houde & Todd, 2011): People judge the expected outcomes of their actions *relative* to some reference point. This reference point is determined by

- their own goal setting (e.g., energy use relative to self-set goal of reducing consumption by 10%),
- their own past experiences (e.g., energy use in the focal year relative to energy use in the previous year) as well as by
- information about the outcomes for other people ("peers") (e.g., energy use in the focal year relative to average energy use of peers in the focal year).

Consequently, providing information about relevant peers' (e.g., neighbours) successful energy conservation efforts has been shown to work much more effectively than providing rather abstract information about environmental consequences (e.g., Houde & Todd, 2011). However, this decision-making relative to some reference point also implies that there are particular challenges involved in stimulating people who are exceeding the target (e.g., use less energy than the average of relevant peers) to further engage in energy conservation. Schultz et al. (2007) found that this is, however, possible: households that had already achieved below-average energy consumption could be encouraged to further reduce energy use by providing them not only with information on the average use but by adding something as trivial as a smiley face symbol next to the comparison.

Status and self-image[17]

Generally, prior research has shown that individuals have strong preferences for occupying a high position in the social ranking among their peers, and this preference is likely to be an important motivation of human social and economic behaviour (Barankay, 2012). For example, rankings and league tables, where people are ranked relative to

[17] See Appendix A.5.4 for more details.

others in terms of a performance measure, are a pervasive feature of life (e.g. employers use them to measure employee performance and determine bonuses and promotions) (Grote, 2005). Beyond the monetary benefits that may go along with high rankings, it has also been argued that people may care about their ranking per se, even when rankings have no financial consequences (referred to as "rank incentives", as they directly affect self-image) (Benabou & Tirole, 2003; Köszegi, 2006) and convey status (Moldovanu et al, 2007, Besley & Ghatak, 2008). A crucial element for the effectiveness of nudges to appeal to individual's status seeking and desire to improve their (self-) image is public visibility. Ariely et al. (2009) refer to this as image motivation (or signalling motivation) and characterize it (p. 544) as "an individual's tendency to be motivated partly by others' perceptions. Image motivation therefore captures the rule of opinion in utility, i.e., the desire to be liked and respected by others and by one's self." Houde and Todd (2011) suggest that tools that appeal to image motivation could be to display boards or lists of people who have made substantial energy conservation contributions. Interestingly, this striving for (self-)image and status works not only at the level of the individual but also at the group level (e.g., competitions between neighbourhoods with respect to energy reductions, Houde & Todd, 2011).

The desire for social approval is one of the reasons why individuals act more generously in public if their generosity is visible to others (Hollander, 1990). Studies by Andreoni and Petrie (2004) and Rege and Telle (2004) show that recognizing contributors by revealing their identity increases contributions to public goods. Social groups, charity organizations and online communities publicize individuals' contributions for this reason, and very few contributions are actually done anonymously. Samak and Sheremeta (2013) confirmed in a recent laboratory experiment that contributions to a public good significantly increased when contributors were acknowledged (i.e., photos and names of all contributors are displayed after the contribution stage) relative to when contributors were not acknowledged. When viewing information about contributors was costly, there was no significant difference in contributions as compared to the case where all contributors are recognized by default, suggesting that just the possibility of being recognized is sufficient to drive the increase in contributions. This effect holds even though the identities of contributors are viewed less than 10% of the time. They also pinpoint which information is most effective at increasing contributions. Recognizing only the highest contributors was not significantly different from not recognizing contributors, while recognizing only the lowest contributors was as effective as recognizing all contributors. This finding suggests that it is the fear of shame, rather than the anticipation of prestige, that drives the identification-related increase in contributions in their experiment.

Combined effects

Generally, prior research suggests that while individual nudges in isolation may have significant, substantial, and lasting effects on individuals' (pro-social) behaviour, combining several complementary nudges in a suitable manner greatly enhances their behavioural effectiveness—often at only a small additional cost. For example, studies on goal setting (Becker, 1978; McCalley & Midden, 2002) showed that combining goal

setting with feedback was more effective than goal setting alone. Information has also proven to be more effective when used in combination with other interventions (e.g. Van Houwelingen & Van Raaij, 1989).

Effect sizes: Effectiveness of nudges

Early research in the late 1970s and 1980s into the effects of non-monetary incentives in stimulating pro-social and in particular energy-conscious behaviour mostly focused on identifying significant effects of a variety of nudges. The issue of effect size has attracted increasing attention more recently, in particular, in studies employing field data. Meanwhile, an emerging literature on energy consumption has begun to measure the effectiveness of non-price interventions, including social approval (Dolan & Metcalfe, 2013), and consumption feedback, goal setting, and commitment (Abrahamse, *et al*, 2005).

In their meta-analysis of 19 studies on the effects of **commitment** on pro-environmental behaviour Lockhorst et al. (2011) found that the average effect sizes were moderate and similar (r = .27) for commitment only and (r = .31) for commitment plus another treatment during the intervention period, and fairly robust. Also with respect to long-term lasting behaviour they found moderate average effect sizes for commitment only (r = .18), and for commitment plus another treatment (r = .26). [18]

For **information provision** experiments have pointed to a potential for electricity use reductions in the magnitude of between 5% and 20% (Stern 1992, Fischer 2008). [19] It is important to note that many of these interventions have been relatively small scale, short-term pilots on non-representative populations. Nevertheless, Allcott and Mullainathan (2010) argue that the results show proof of concept. They also discuss in some detail a recent large scale example provided by a company called OPOWER. Between 2007 and 2009, OPOWER partnered with utilities in Northern and Southern California, Washington, Minnesota, Illinois, Colorado, Virginia, and other states in the U.S. in order to send energy use reports to residential electricity and natural gas consumers. The reports displayed the household's energy consumption, compared it to similar households over time, and provided energy conservation tips. The **social comparisons** were based on research that showed that descriptive social norms are better at reducing energy use than appeals to saving the environment and to social responsibility, despite the fact that many

[18] With the aid of the Z-scores provided by a Mann-Whitney test, the effect size can be computed, Applying the formula introduced by Fritz, Morris and Richler (2012) the effects size is calculated as: $r = z / \sqrt{N}$. A value of r of 0.5 indicates a large effect; a value of r of 0.3 indicates a medium effect and a small effect is present when r is 0.1.

[19] "There are three main factors at the source of this heterogeneity in outcomes. First, studies have employed different research designs. A fair share of the estimates publicly available come from pilot programs implemented by electric utilities. These pilot programs vary in size, participant selection procedures, duration and evaluation methods, making it difficult to reconcile the large differences in the statistical estimates. Second, the features of the feedback technology, such as timeliness, data display, interactivity, sociability, and controllability play a significant role in inducing energy reductions and have varied substantially across studies. Third, there is significant heterogeneity in the characteristics of the population of consumers participating in feedback interventions." (Houde et al., 2013: 88)

households claim that social norms have little influence on their behaviour (Nolan et al. 2008). Comparing the electricity bills of treatment and control groups gave a rigorous estimate of the actual energy conservation caused by the reports. Subsequent analysis showed that OPOWER's reports caused households to reduce energy use by about 2%, depending on the program's location, frequency, and duration.

Recent studies provide substantially higher estimates for effect sizes. In a study of two natural field experiments (NFEs) for the U.K., Dolan and Metcalfe (2013) found that **social norms** reduced energy consumption over a 15 month treatment period by around 6% on average.[20] Houde et al. (2013), in a field experiment in the U.S., found a similarly sized effect.

Houde et al. (2013) also report that **real-time feedback** via technology in their study effectuated reductions in households' electricity consumption of, on average, 5.7 %. In their meta-analysis of 57 studies on energy savings from various feedback approaches, Ehrhardt-Martinez et al. (2010), finally, report average savings of around 12 % for real-time feedback technology. They moreover report that median energy savings, across all countries in the analysis and across all decades, for studies that employed both daily/weekly **feedback** and real-time plus feedback were both above 10% (11% and 14%, respectively). However, they also note that most of these studies covered relatively small sample sizes and short durations, and conclude that future studies with large sample sizes and longer duration are called for. Furthermore, they report that programs that relied on enhanced billing strategies achieved savings of 5.5% on average. Another difference related to the distinction between programs focused at reducing peak load energy consumption versus programs aiming broadly at energy conservation across all times of the day. In their meta-analysis they found that energy savings from feedback programs focused on peak load achieved average savings of around 3%, while broader feedback programs achieved savings of around 10%. It should be noted, though, that these studies generally included some combination of feedback, time of use rates and/or incentives and thus do not represent savings from a single type of intervention.

At an aggregate level (e.g., national, city), the total amount of energy savings from the different types of feedback hinges on two key factors: average household-level energy savings associated with a particular type of feedback and likely level of household participation. Therefore, they suggest that once participation rates are taken into consideration, the implementation of real-time plus feedback programs is likely to generate the most dramatic energy savings across a given regional entity (on the order of 6%), with the second highest aggregate level of energy savings likely to result from aggregate, real-time feedback programs (approximately 4% savings).

[20] Two important differences compared to the field experiment involving OPOWER were that, first, the statements referred to in Dolan and Metcalfe (2013) were households' actual energy statements, whereas the social norm intervention implemented by OPOWER (opower.com) was the Home Energy Report (HER), which was sent separately from the regular energy statement of their utility company. Secondly, Dolan and Metcalfe (2013)'s control group had an energy statement, although they did not have the social norm information. The control group in the previous studies related to OPWOER did not have a HER

For the specific case of the Netherlands, KEMA has forecasted energy savings on the order of 3,2% (for electricity) as part of a cost-benefit analysis of smart meters when combined with bi-monthly indicative energy statements. When feedback is directly provided via an real-time display, KEMA has forecasted energy savings in the order of 6,4% (for electricity). For these effect sizes KEMA refers mainly to the meta study by Darby (2006). In this study a large variance of effect sizes is reported, ranging from 0% to 13% for indirect feedback and from 1% to 27% for direct feedback. KEMA does not report how the percentages for the forcasted energy savings were calculated.

Costs: Efficiency of nudges

A reduction in energy use has to be evaluated against the costs of the specific behavioural intervention. Especially in large populations, they can be extremely cost effective in reducing energy use and abating carbon emissions. OPOWER's letters, for example, required that utility paid only for a letter and a postage stamp. Allcott and Mullainathan (2010) argue that, given an estimate of the cost of the reports, the cost to the utility per kilowatt-hour (kWh) saved is 2.5 cents, and further, that this point estimate compares favourably to recent point estimates of the average cost of other utility energy efficiency programs, which in two other recent studies ranged from 1.6 to 3.3 (Friedrich et al., 2009) and from 5.5 to 6.4 cents per kilowatt-hour (Arimura, Newell, & Palmer 2009). In considering how meaningful such reductions are, they further estimate that, if implemented on a national scale in the U.S., a program like OPOWER could reduce emissions by 12.7 million metric tons (MMT) of CO2 annually. By comparison, total annual U.S. emissions are estimated at approximately 6,000 MMT, of which 2,400 MMT are from the electricity sector. Hence, scaled nationally, the aforementioned one intervention alone is argued to potentially reduce US carbon emissions from electric power by nearly one per cent.

Types of decision-makers and context: Managers versus private households

Compared to individuals that take decisions in private households, managers are in a different position: They are accountable and have to justify their actions to shareholders; and they have to do so in a heavily competitive environment (in case of profit-oriented organizations, at least). In modern firms, the principal-agent relationship between shareholders and managers implies that nudging managers towards adopting energy conservation measures may be a more complex endeavour even, than nudging private households in this direction (see Appendix A.4. for an overview of the relevant theories).

Using a large scale field dataset, Muthulingam, Corbett, Benartzi, and Oppenheim (2009), found that managers were frequently myopic about the adoption of energy-saving programs. Very often they failed to opt for investments which would have been profitable in the long-term but might have had an adverse impact on current cash flow and short-run performance, implying a greater need to justify such choices towards stakeholders. Moreover, Muthulingam et al. (2009) found that managers focused on costs rather than on benefits in their evaluation of energy efficiency alternatives, and on the order in which

options and recommendations were presented to them, favouring those which were mentioned early on in the list—a clear example of the impact of framing. Specifically, Muthulingam et al. (2009) studied the adoption and non-adoption of energy efficiency initiatives (process improvement recommendations) based on a database of more than 100,000 recommendations provided to more than 13,000 small and medium sized manufacturing firms in the U.S: for the period 1981-2006. Even though the average payback period across all recommendations was just over one year, many of these profitable opportunities (around 50%) were not implemented. Overall, there is, hence a substantial gap in the implementation of actually profitable, energy-conserving measures.

Prior research has advanced several explanations for this implementation gap. First, decision-makers within firms may have insufficient information about profitable investments. Collecting this type of information is time- and resource-consuming (Velthuijsen, 1995), and firms may face constraints in the form of scarcity of managerial time or lack of skilled personnel (Beckenstein, 1986; De Almeida, 1998). Indeed, several case studies indicate that organisational and institutional barriers are important (De Almeida, 1998; DeCanio, 1998). Second, when deciding about future technology, firms may face constraints due to market imperfections such as capital rationing (Howarth & Sanstad, 1995). Third, energy efficiency is often just one of many criteria affecting the choice of equipment, and not necessarily one of paramount importance (Reddy, 1991). Fourth, the assumption of optimizing behaviour may be false (Howarth & Sanstad, 1995). For example, decisions may be based on (very short) payback periods rather than the net present value criterion (DeCanio, 1998). Fifth, the economic agent who makes the investment decision may not be the same as the one who receives the gain (e.g., insulation of rented buildings). Sixth, and closely related to the first point, transaction costs may be prohibitively high (DeCanio, 1998; Howarth & Sanstad, 1995). Uncertainty about the future and about whether and how the implementation of new energy-efficient technology might disrupt existing production processes have also been raised as potential explanations of the existence of unexploited ‘profitable’ investment options in energy-saving technologies (Hasset, 1993). Finally, Muthulingam et al. (2009) themselves suggest that cognitive and behavioural biases play a part in the emergence of this implementation gap.

Conclusions from the Literature Review

A large body of research in psychology and behavioural economics has, by now, documented, first, that humans’ judgment and decision-making are flawed and biased in systematic and predictable ways, including as well decisions on energy consumption. Second, by appropriately designing nudges to address these flaws and biases, policy-makers may be able to improve people’s decisions regarding energy conservation both from an individual and societal viewpoint. Prior laboratory as well as field studies have investigated governmental interventions aimed at improving energy efficiency of private households, in particular, using: information and feedback about social norms, information about conservation measures, commitment devices, appeals to status and self-image concerns, and sometimes combinations of these nudges. Such governmental interventions may also prove exceptionally cost-effective, given that nudges as non-

monetary incentives are often comparatively cheap to implement. However, attention to details is crucial. Seemingly small design features ("framing") can have drastic consequences in terms of effectiveness, both regarding significance and effect sizes, as well as possible decay of influence and even actually reaching the specific target group). For example, the mode of delivery appears to be highly influential. Despite their appeal due to low costs and wide-ranging possibilities for customizing information and feedback, online interventions appear to be much less effective than offline measures.

2.3.2 Results from the Experimental Studies

The purpose of the experiments conducted in this project was, on the one hand, to complement previous research by investigating new nudges, by combining instruments, and by testing specific features of nudges in an empirical relevant way. On the other hand, the experiments served to investigate the difference in responses toward specific nudges by individuals as members of private households and individuals as managers of a firm. The following three experiments (presented in order of increasing applicability to specific policy instruments) were run in June 2013 in the Experimental Laboratory of Sociology and Economics (ELSE) at Utrecht University.

Legacy Reminders as Norms

The aim of the first experiment was to investigate the usefulness of legacy reminders as a way of enhancing intergenerational beneficence and stimulating pro-social behaviour (for a detailed description of the experimental set-up see Appendix B.1). The study tried in a first step to replicate the findings by Wade-Benzoni, Tost, Hernandez and Larrick (2012) by showing that negative legacy reminders (death anxiety) can reliably generate pro-social behaviour. More importantly, in a second step, it aimed at investigating whether a legacy concern could be created differently, i.e. by reminding people of legacy in a positive way instead by death anxiety (positive legacy reminder). Such a reminder would then need to stress how legacy is a way of giving meaning to one's life. In line with previous research, we expected that (1) in conditions of negative legacy reminders (death anxiety) individuals would allocate more resources more often to future others than to present-others, because of their desire to leave a legacy. Additionally, (2) we hypothesized that using a positive legacy prime (meaningful life) would have the same effects as using a death prime to induce the fear of death.

The analysis of the experimental results (see Appendix B.1) revealed that overall participants donated significantly more often in the present-other conditions (M=.537, SD= .062) than the participants in the future-other conditions (M=.377, SD=.065). $F(1,119)=3.171$, $p=.078$. Moreover, we found that none of the two primes (positive or negative) did lead to significantly different donations compared to the control group. This finding refutes previous findings from the literature concerning the effects of negative legacy reminders (death anxiety). However, presented in Figures 2 and 3, we find that regardless of (future or present) framing, more women than men donated money in the

negative prime conditions, and they donated a higher amount (differences are statistically significant).

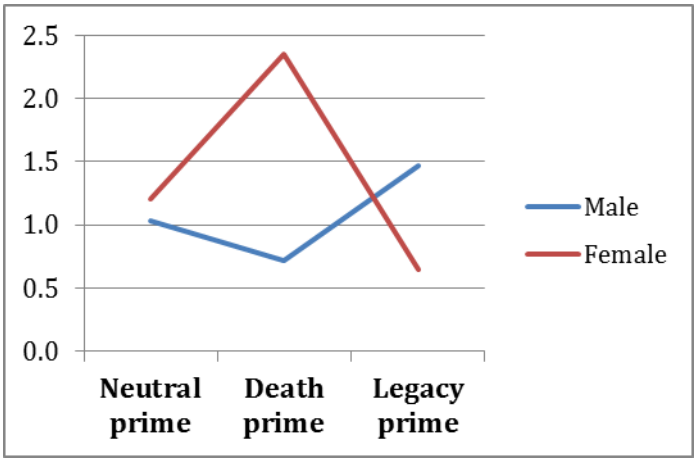

Figure 2: Mean amount of money donated for men and women

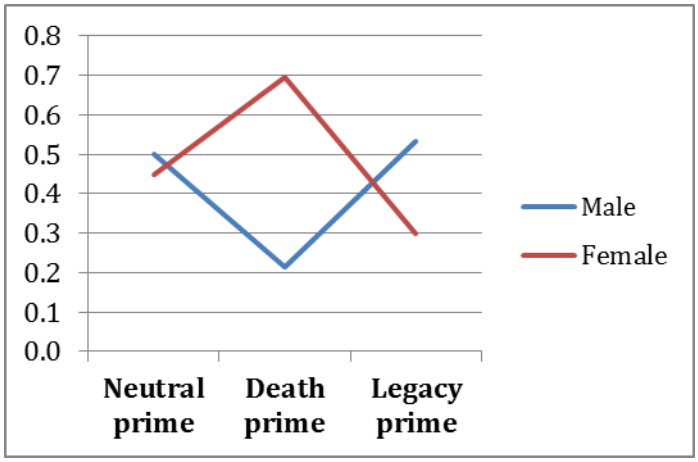

Figure 3: Mean frequency of donation for men and women

We conclude that legacy concerns, regardless of whether they are negatively or positively evoked, do not significantly stimulate pro-social behaviour and can therefore as such not be considered effective 'nudges'. The results also indicate that pro-social behaviour with respect to 'distant' others (in time or space) is much lower than with respect to 'close' others. It therefore seems important to emphasise *present* benefits of pro-social behaviour and to refer to the domain of the immediate family as immediate beneficiaries to decrease "social, temporal and spacial" distance. While positive legacy reminders have no significant effect on pro-social behaviour, we observe significantly different effects on women and men. The direction of the effect is to reduce donations by women and increase donations by men. Negative (death prime) legacy reminders have a significant positive effect on pro-social behaviour of women (and a slight, insignificant one on men). If at all, the use negative (death) legacy primes might be considered in typically women dominated environments while the use of positive (meaningful life) legacy reminders might be considered in typically men dominated environments.

Commitment

The aim of the second experiment conducted for this project was to investigate the usefulness of commitment devices as a nudge to stimulate future pro-social (e.g. energy saving) behaviour. For a detailed description of the experimental set-up see Appendix B.2.

While Pallak and Cummings (1976) as well as Winett et al. (1982), used public commitment (in the form of signed commitment published in a leaflet, or saving goal signed with the experimenter), the focus in this experiment is on private commitment. Moreover, while previous study showed that *public* commitment can lower present energy consumption, we were interested in finding a similar positive effect of *private* commitment on *future* pro-social behaviour. Such an effect would allow concluding that

simple non-binding commitments, e.g. entering a planned maximum consumption together the actual meter readings, or non-binding signing up for purchase of more energy efficient technology in the coming year at local stores, could induce more energy efficient behaviour.

In the experiment we found that participants in the experiment were indeed willing to postpone present consumption in favour of future payments to an environmentally oriented charity. Table B.2.1. in Appendix B.2 indicates that there are no significant differences between the group with a commitment device and the control group when decisions concern future payments. But when decisions concern present payments the decisions of the two groups were statistically different: the control group donated on average €0.84 (6,96 %), while the commitment group donated significantly more with on average €2.37 (19,79%). This experiment is innovative in the sense that it is the first to measure pro-social behaviour with respect to future others. It allows us to conclude that in general pro-social behaviour with respect to 'distant' others (socially, in time or space) is much lower than with respect to 'close' others (participants were on average willing to only relinquish 7-19% of their income to future others, compared to 30-40% as measured in other comparable experiments on present pro-social behaviour). We also find that a significant share of individuals (33%-55%) exhibit similarly time-inconsistent preferences regarding own payments as well as regarding charity payments.

Non-binding private commitment in the form of "cheap talk" does seem to have a weak effect into the desired direction, but this effect is only strong enough to show meaningful significant results when the pro-social behaviour has immediate consequences in the present. Decisions with pro-social consequences in the future are not significantly affected by the commitment "nudge". We conclude from these findings that in order to stimulate energy efficiency and curtailment behaviours, non-binding commitment devices need to relate the consequences of these behaviours to immediate, present benefits for the decision maker him or herself as well as to others.

Norms and Ranking and Individuals' and Managers' Pro-Social Behaviour

The aim of the third experiment conducted for this project was to compare the usefulness of norms and public ranking as instruments to stimulate pro-social behaviour, and to specifically study the differences in effects of the two instruments on individuals and individuals in managerial positions ('managers'). For a detailed description of the experimental set-up see Appendix B.3.

Social comparison has been argued to influence pro-social behaviour (Andreoni & Petrie, 2004) in general, and a large library of studies (Alcott, 2011; Doland and Metcalfe, 2013; Arimura et al., 2011; Ferraro & Price, 2011; Fischer, 2008; Friedrich et al., 2009) supports positive effects of norms on energy conservation behaviour of households. The lack of studies regarding firm and manager behaviour motivated the direct comparison. Combining the insights of institutional and stakeholder influence with stewardship theory and empirical research on power and pro-social behaviour (presented in detail in

Appendix A.3) leads to the expectation that individuals in managerial positions as individuals with power will behave more pro-socially than individuals who do not possess this power. Moreover, while the non-monetary rewards (pride, image, prestige) or punishments (shame) are relevant to all individuals, the fact that managers have more visibility in the organization and are accountable to the stakeholders for their actions, makes acquiring reputation even more important for them. Therefore, we expect social norms and visibility to have a higher effect on 'managers' than on individuals. Individuals in managerial positions are thus not only expected to act more pro-socially than individuals when such nudges are present, but also to change their behaviour more than individuals when social norms and visibility are salient.

In the experiment pro-social behaviour is measured as the contribution of participants to a public good. In this strategic setting participants were allocated to groups of 4 and the reward of each participant depended on the decisions of all participants within the same group. For the purpose of comparison, participants in one set of treatments were situated in a business context which included priming (unconscious manipulation) and the explicit justification of decisions.[21]

The average contributions in all treatments are presented in Figure 4, while Table 1 summarizes the most important insights: The median contributions do not change significantly between the control and norm treatment for individuals. However, for 'managers', there is significant increase in contributions to the public good in the norm treatment. Similarly, no significant change in contributions is found between control and ranking treatment for individuals, while again, for 'managers', contributions in the ranking treatment are significantly higher. Moreover, 'managers', on average, contribute significantly more when confronted with a norm than do individuals. When comparing the effect of the two nudges in the individuals and 'managers' sessions, respectively, individuals significantly increase their contributions in the ranking treatment, compared with the norm treatment, but there is no significant difference in median contributions in the norm and the ranking treatments for 'managers'. Based on the Z-scores from the Mann-Whitney test, effect sizes, following Fritz, Morris and Richler (2012), are presented in Table 1.

[21] Of course it would have been preferable to observe behavior of "real managers", but as this study is the first to investigate the comparison between individuals and managers, given financial as well as practical constraints, we think that the present study serves as a valid pilot. The fact that our subjects in the manager treatments score significantly higher on a ex-post psychological measure regarding "Machiavellism (the end justifies the mean)", indicates that the priming was indeed affective.

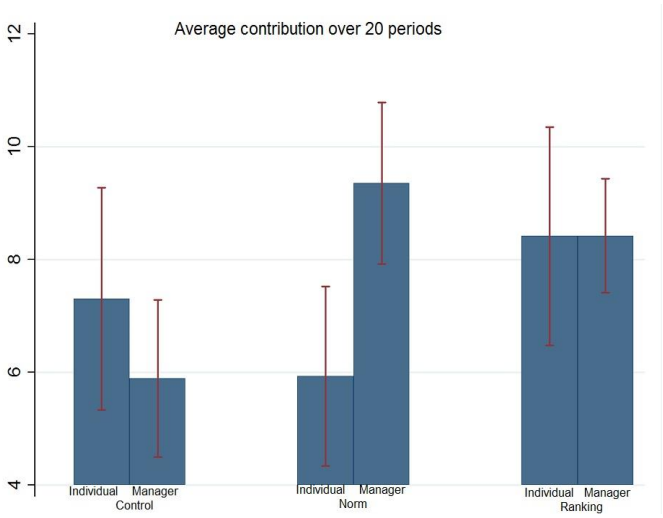

Figure 4. Average contribution in all treatments over 20 periods.

	Z-score	**Effect size**
Individuals Norm vs. Control	1.056	0
Individuals Ranking vs. Control	-0.784	0
Individuals Ranking vs. Norm.	-1.974**	0.27; medium negative
Managers. Norm vs. Control	-3.114***	0.42; large negative
Managers Ranking vs. Control	-2.478**	0.34; medium negative
Managers Ranking vs. Norm	1.258	0
Managers C vs. Individuals C	0.99	0
Manager N vs. Individual N	-3.246***	0.43; large negative
Manager R vs. Individual R	0.021	0

*,**,*** indicate p<0.1, <0.05, <0.01

Table 1. Effect sizes

In contrast to previous (field) studies, we find that individuals' response to a (informative and injunctive) norm is insignificant. We conjecture that due to the explicit strategic character of the setting, the potential positive effect of the norm on the individual pro-social decision is weakened: the strategic situation increases private monetary costs of pro-social behaviour and increases private monetary benefits of selfish behaviour, leaving social costs and benefits, as well as private non-monetary benefits (positive self-image) and costs unaffected. Therefore the same individual is expected to respond to a comparison with a social norm by displaying higher levels of pro-social behaviour in a non-strategic setting. Further studies need to confirm this conjecture, but for the time being, we conclude that informative and conjunctive norms should only be used in explicitly non-strategic settings, and explicitly not when there are clear trade-off between private benefit and social benefits. However, our results also indicate that it is recommended to use a social norm that can hardly be affected by the individual's own behaviour but is still psychologically close enough (e.g., energy consumption in the EU, as opposed to the broader neighbourhood).

We find a medium size positive effect of addressing individuals' image concerns (ranking). This finding suggests using rankings in explicitly strategic settings (i.e. when individuals can influence the norm itself). The strategic situation directly affects private non-monetary benefits (positive image) and costs (negative image) of behaving pro-socially. Addressing these image concerns in the form of "naming and shaming" leads to increased pro-social behaviour. It might even be more effective to increase competitiveness by ranking groups of individuals. Further studies need to confirm this conjecture.

Interestingly, by comparing behaviour in the two rounds of the experiment (participants made two sequences of 10 decisions, in between which they were confronted with the norm, or rank respectively) we find that for individuals the anticipation of the confrontation with a norm or a ranking has similar effects as the experience of the norm or rank itself.

Our results of the treatments with participants in the 'managers' setting hint at a potential large positive effect of managers' response to a norm, and only a medium size positive effect of addressing managers' image concerns (ranking). We attribute the difference between the individuals and 'managers' to the fact that the individuals in managerial positions were asked to justify their behaviour. The justification of low contributions in comparison to a general absolute norm might be considered to reveal more selfishness than the justification of a low rank, which is relative within a small group of 4 others (who might all have behaved selfish).

While the anticipation of the confrontation with a norm has similar effects on 'managers' as the experience of the norm itself, the anticipation of a ranking has stronger effects than the experience of the ranking itself.

These finding suggest that giving households feedback about their relative ranking in relation to a relevant peer group may induce more pro-social behaviour, i.e. lead to more energy savings. Moreover, households' ranking based on their energy consumption in relation to a relevant peer group should be made publicly visible. Further research is needed to identify the appropriate scope of the relevant peer group ("close enough in terms of social distance, but not so small as to be strategic") for such rankings to be most effective (e.g. a group based-ranking follow-up study).

For firms our findings suggest to use informative and conjunctive norms and to let firms regularly justify their relevant investment decisions (justification should be publicly visible and explicit, and in a form that directly links the person with the content (e.g., in writing or speaking, rather than signing only). When applying explicit rankings, these should be done randomly (over time or over ranked firms or industries) to refer to the strong positive affect of the anticipation of the ranking.

Conclusions from the Experimental Studies

In *non-strategic* contexts, time-inconsistent preferences may be a reason why energy consumers fail to engage sufficiently in energy conservation (even if it would be in their own financial interest). Consequently, we tested two nudges that address individuals' assessment of costs and benefits *across time*, namely legacy reminders (both positive and negative), and commitment.

Our experiments allow for two general conclusions. First, our results reveal that indeed the preferences of 33% of individuals are time-inconsistent, not only with respect to own benefits but also regarding social benefits (43%). This implies that their dislike for postponing benefits in the present to the near future is much larger than their dislike for postponements at any later moment. As a consequence, it seems important to emphasise the benefits of energy saving behaviour in the present in order to stimulate individuals to internalise them in their decision making. Second, our results indicate that low social distance to the beneficiaries of pro-social behaviour has a positive effect on such behaviour of an individual.

With respect to the effect of private, non-binding commitment devices our results indicate that they only weakly increase pro-social behaviour, and that this positive effect is strongest (with approximately 12%) only when individuals can immediately live up to their commitment. With respect to legacy reminder we find no significant effect on pro-social behaviour. Such reminders can therefore as such not be considered effective 'nudges'.

In *strategic* contexts, energy consumers' neglect of collective interests (free-riding) may be a reason for why they fail to engage sufficiently in energy conservation (even if it would be in their own financial interest). Consequently, we tested two nudges that address individuals' *concern for collective interests*, namely social norms as reference points, and ranking. Moreover, we explicitly analysed decision making of individuals in a managerial position ('managers').

In contrast to previous (field) studies, individuals' response to a (informative and injunctive) norm in our experiment is insignificant. We conjecture that due to the explicit strategic character of the setting, the potential positive effect of the norm on the individual's pro-social decision was weakened. While further studies need to confirm this conjecture, we conclude that informative and conjunctive norms should only be used in explicitly non-strategic settings, and explicitly not when there are clear trade-offs between private benefits and social benefits. Therefore, the challenge is to identify social norms that can hardly be affected by the individual's own behaviour (non-strategic decision setting) but at the same time are psychologically still close enough (e.g., energy consumption in the broader neighbourhood, as opposed to in the EU).

Addressing individuals' image concerns in form of public ranking had a positive effect, suggesting that rankings are effective in explicitly strategic settings (i.e. when individuals can influence the norm itself). It might even be more effective to increase competitiveness by ranking groups of individuals—a conjecture that further studies need to confirm.

Social norms had an even bigger effect in raising contributions to the public good of individuals in managerial positions. Moreover, our results lead us to conjecture that explicitly asking individuals for a justification of their decisions vis-á-vis a social norm has a positive effect. Again, further studies would need to confirm this conjecture.

3. Applications to Specific Instruments

3.1 Instruments Targeted at Private Households

In order to nudge the energy efficiency of private households is important to give them feedback about their energy consumption. All households in the Netherlands receive a "jaarlijkse energierekening"; hereafter referred to as "annual energy bill" for their energy consumption during the past 12 months.

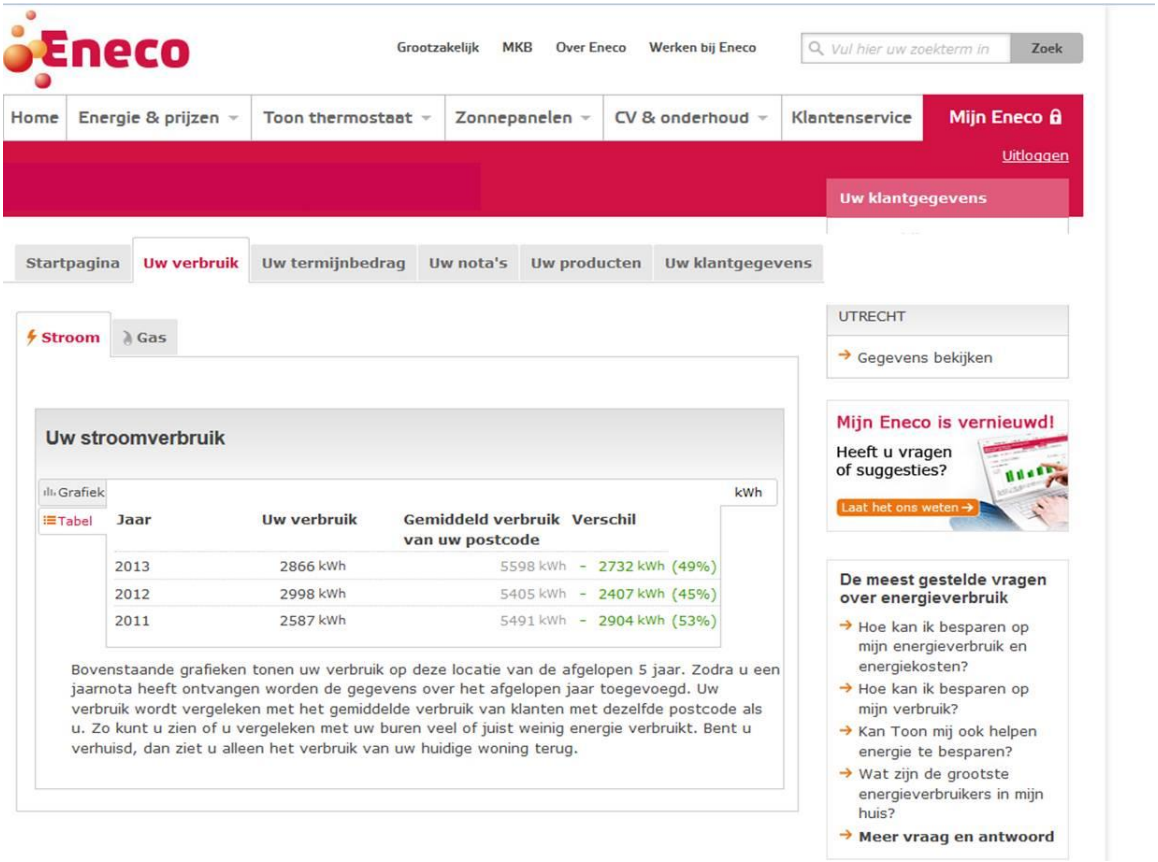

Figure 5: Example screenshot of an annual energy bill for a private household provided by Eneco for the year 2012[22]

[22] Note that the example relates to the annual energy bill, not to an indicative bi-monthly energy statement. Hard-copy energy bills currently include only the information about the household's own past

Figure 5 displays an example screenshot of an annual energy bill for a private household provided by Eneco for the year 2012. Interested consumers can also use additional services in order to compare their energy consumption with that of others during a certain time period. [23] Figure 6 displays an example screenshot of this service as provided by Milieu Centraal. It should be noted, however, that making full use of all this information requires a fairly pro-active Behavior on the part of consumers, who need to go online and may need to look up additional information (e.g., latest meter readings) that they are asked to fill in to allow for the comparison. Prior research suggests problems related to overcoming consumer inertia in the use of such services, especially online (e.g., Dolan and Metcalfe, 2013). Possible complications here are (1) that online applications, due to the required proactivity, tend to reach only those energy users that are already more aware of and concerned about energy conservation than the average consumer, i.e., those that are least in need of any additional information or nudge; (2) that the threshold of the acquired proactivity may deter consumers from seeking out the additional information; and (3) whether the offered reference groups (e.g., postcode area) are indeed equivalent to those reference groups that the individual consumer perceives as relevant peer group for any such comparison.

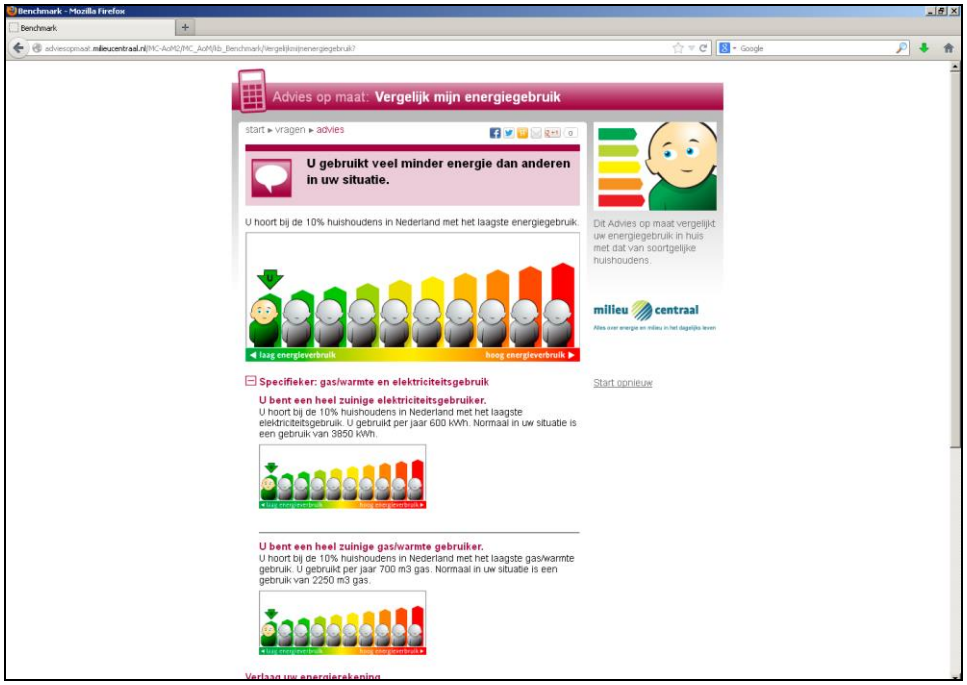

Figure 6: Example screenshot from http://www.milieucentraal.nl/themas/energie-besparen/gemiddeld-energieverbruik-in-huis

consumption, whereas online billing tends to offer richer information. A household's annual energy usage is calculated by the energy provider based on an annual meter reading. Consumers either provide the meter readings themselves to the provider (via mail, internet, or by phone), or a firm that specializes in meter reading does this, or the meter itself transfers the data ("smart meter", please see below).

[23] One such service is offered e.g., via http://www.milieucentraal.nl/themas/energie-besparen/gemiddeld-energieverbruik-in-huis.

Anecdotal evidence suggests that consumers like to compare themselves, in particular, with their neighbours (neighbourhood as reference group), and that the composition of the household also plays an important role (e.g., comparing households with two grown-ups and two children in the same neighbourhood vs. single-person households within the same neighbourhood. Given these limitations and the fact that indirect feedback with a higher frequency and direct (real-time) feedback offer more opportunities to nudge enery saving we focus in the following section on the smart meter in combination with bi-monthly energy statements and/or real-time displays.

The Smart Meter with bi-monthly statements and/or Real-Time Display

The term "smart meter" (or "smart energy meter") commonly refers to an electrical meter that records consumption of electricity in regular intervals (usually between several minutes to < 1 hour) and communicates this information back to the utility at least once per day, in order to facilitate monitoring and billing purposes (Federal Energy Regulatory Commission, 2008). Smart meters are able to gather data for remote reporting and, therefore, allow for two-way communication between meter and central system. While the smart meter itself only measures, it is usually combined with a feedback mechanism such as a bi-monthly indicative energy statement and/or an (in-home) real –time display (RTD). Smart meters combined with feedback tools are a device that is of particular relevance for private households as consumers of energy. From the perspectives of these consumers, smart meters have several advantages. They provide them with detailed information about their annual energy bills. Also, they provide fine-grained and timely information about a household's energy use. For example, a smart meter (with a display or usage monitor) would provide precise information about the energy used by taking a 15-minutes shower in the morning and the associated costs. Furthermore, if desired by policy-makers, they allow for billing based on actual consumption rather than estimates throughout the year[24], and consumers do not have to provide meter readings themselves anymore, adding to their convenience.

More specifically, the EU has defined common requirements for smart meter functionalities (Van Gerwen, 2012). The Commission has included in the recommendation 2012/148/EU ten common minimum functional requirements for electricity smart metering systems. The recommendation is proposing that all electricity smart metering systems must be equipped with the functionalities summarized below:

<u>For the customer</u>

1. Provide readings to the customer and to any third party designated by the consumer.
2. Update the readings frequently enough to allow the information to be used to achieve energy savings (at least every 15 minutes).

[24] In the case of the Netherlands, billing based on advance downpayments is considered to have substantial advantages in the sense that it implies that households pay an equal amount of money each month, rather than experience critically high bills in the winter months.

For the metering operator

3. Allow remote reading of meters by the operator.
4. Provide two-way communication between the smart metering system and external networks for maintenance and control of the metering system.
5. Allow readings to be taken frequently enough for the information to be used for network planning.

For commercial aspects of energy supply

6. Support advanced tariff systems. Include advanced tariff structures, time-of-use registers and remote tariff control.
7. Allow remote ON/OFF control of the supply and/or flow or power limitation

For security and privacy

8. Provides Secure Data Communications;
9. Fraud prevention and detection.

For distribution generation

10. Provides Import / Export and Reactive Metering.

The basic idea behind smart meters is that they may "facilitate energy efficiency by empowering consumers with more detailed, accurate and timely information regarding their energy consumption and costs, thus helping consumers, reduce any unnecessary energy usage and shift any discretionary electricity usage away from peak consumption times" (Hiscock et al., 2013, p.22).

In 2006, the European parliament issued a directive to member states in order to introduce smart meters in private households. Specifically, the third European Energy Agreement specified that, given certain conditions in 2020, at least 80% of all private households in member countries should have a smart meter. In response, the Dutch government proposed in 2007 that all private households should be equipped with a smart meter by 2013, as part of a national plan to increase energy efficiency. However, subsequently, privacy and security concerns were raised by consumer groups following the publication of governmental plans to make the installation of smart meters compulsory. In particular, the publication of a report by Tilburg University researchers contributed to the emergence of the debate. The report, which had been commissioned by the *Consumentenbond*, concluded that there were serious privacy issues with smart meters.[25]

[25] Privacy issues with smart meters, related in particular to the following issues: (1) fine grained readings in hourly or even 15-minutes intervals might reveal information about a consumer's habits (e.g., when s/he leaves the house or returns). This information could be useful to burglars. (2) The information transmitted by the smart meters might provide insights into a household's living conditions and even relationships. The automatic and mandatory transmission of such information might, therefore, affect people's freedom to do as they please in the confines of their homes. (3) The risk that information about a person's or household's energy use would fall into the hands of third parties such as the police or insurance companies was judged

Supporters of the original legislation (making adoption mandatory) argued that privacy issues had been exaggerated. In particular, they compared the information revealed by smart meters with information transmitted during use by mobile phones, arguing that here providers are able to tell the exact location of a consumer, his/her identity and the identity of the other party, and so on. As a result of this debate, the roll-out of smart meters was delayed substantially and was also revised in details. The revised plans entail that the deployment of the roll-out is mandatory for distribution system operators (DSO), with an opt-out option for the consumers, that is, consumers may refuse the installation of the smart meter or have the option to have it administratively switched off. Furthermore, the revised legislation implies that, as default, the smart meter transfers data only in a very limited number of situations: for the purpose of the bi-monthly overview (indicative statement), the annual energy bill, when switching providers, and when moving house. Consumers do, however, have the option to explicitly give their approval for more frequent meter reading.

As to the current status quo of policy-making in the Netherlands with respect to smart meters, the Ministry of Economic Affairs and the Parliament agreed in early 2011 on a voluntary roll-out of smart meters in the Netherlands, available to all private Dutch households and small businesses.[26] At a small-scale, as a pilot in order to gain experience for a large-scale roll-out (planned for 2014), a first roll-out started on January 1, 2012. Between January and July 2012, approx. 120,000 private households received an offer for being equipped with a smart meter. 2,3% of these households refused to receive a smart meter. In total, if these figures can be extrapolated, the small scale roll-out is expected to ultimately cover some 400,000-500,000 smart meters.

The roll-out is accompanied by a legal obligation for energy providers to provide households that are already equipped with a smart meter with *bi-monthly usage- and indicative cost-statements* (hereafter referred to as "indicative statement"), in addition to their normal annual energy bill. These indicative statements are intended to provide households with additional insights into, and hence control over, their energy consumption such that they can strive to reduce their energy consumption. The indicative statements contain actual consumption figures for the corresponding past two months, as well as a comparison with the consumption of comparable households. After the first 12 month period, also a comparison with the household's own historical consumption is possible.

In recognition of the fact that smart meters by themselves do not lead to automatic energy savings, but that consumers may need additional information about energy conservation possibilities and feedback on their usage patterns, a so-called "effectmonitor" accompanies the small scale roll-out. This investigation is led by Agentschap NL in collaboration with the regional network companies and a number of large energy

as non-negligible and potentially serious. For more details see "Monitor EnergiebesparingSlimme Meter Kleinschalige Uitrol" van AgentschapNL.

[26] The subsequent paragraph is based on the documents "Monitor Energiebesparing Slimme Meter Kleinschalige Uitrol", Agentschap NL (2012) and "Stand van zaken uitrol slimme meters", Directoraat-generaal Energie, Telecom & Mededinging. Directie Energiemarkt (2013).

providers. It entails measuring the development of energy consumption of three groups of households: first, actual usage monitoring of a control group of approx. 300,000 households without a smart meter; second, actual usage monitoring of a group of approx. 30,000 households that had a smart meter installed already prior to 2012 and that received the bi-monthly indicative usage statements from January 1, 2012 onwards; third, a survey among approx. 1,000 households that received a smart meter during the first few months of 2012 and that have received the bi-monthly usage statement since then. Completion of this investigation is planned for autumn 2013, implying that results are not yet known.[27]

3.1.1 Relevant Features of Energy Statements and Smart Meters

From a policy-making perspective, core features of smart meters in combination with ***indicative energy statements***[28] and ***RTD*** as policy instruments for fostering sustainable decision-making are their information/feedback and communication functions and their (self-)monitoring function.

As information/feedback and communication devices, they provide the individual household with key information (feedback) about both the amount of energy (electricity and gas) consumed by the household, as well as an indication of the likely corresponding costs. In addition, as sketched above, information is communicated to households that enables them to compare their consumption with other (groups of) households (e.g., within the same postcode) and monitor it over time (self-monitoring function). Any kind of policy that uses these instruments as tools for stimulating pro-social behavior (in this case: energy efficiency) is likely to view these different functions as inextricably intertwined. The question is then how to make best use of them as a bundle to nudge consumers' towards the socially desired energy-saving behaviour. Compared to smart meters with indicative energy statements, smart meters with RTD are capable of providing relevant information about energy consumption more frequently; depending on the precise specifications, they are able to provide more fine-grained information and feedback (e.g., when considering changes in the displayed cumulative level of energy consumption in response to switching on/off individual items such as washing machines and water kettles, even coarse information about the energy consumption of these items can be gauged); they are able to provide more frequent, more detailed, and additional types of feedback, thereby taking the feedback function to a new level, compared to the indicative energy statement; and they are likely to attract more attention, because they are an integral part of a private home and represent interactive devices.[29] Due to these

[27] An additional subject of investigation in relation to the smart meters concerns the effects of their combination with alternative information systems (this is referred to as "potentieelmonitor alternatieve feedback"; examples include information display via smart phones).

[28] The behavior which the bi-monthly cost and consumption statements (here referred to as indicative energy statements) aim at stimulating is energy conservation. This is in contrast to the behavioral objectives of the annual energy bill: here the idea is to ensure comparability of suppliers (e.g., same terminology) such that consumers find it easier to compare and possible switch energy providers.

[29] Note that the combination of smart meter and bi-monthly billing is no automatism, but specific to the Netherlands. As such, in theory, and in practice in other countries, they can well be separated and compared.

additional features, smart meters with RTD can potentially fulfil an additional important function for consumers' self-monitoring of their energy consumption. This is an important issue: deliberate decisions of private consumers in order to economize on their energy costs by reducing their energy usage require at least a basic understanding about how inputs (i.e. behaviours such as temperature of heating in the home, cooking food, and so on) influence the usage output (total resource usage in kWh) (cf. Dolan & Metcalfe, 2013). This understanding most often is not present. While it is obvious that reducing room temperature by a degree Celsius is likely to reduce energy consumption, not many consumers may have a good understanding by how much. This, however, they would need to know in order to make an informed cost-benefit analysis—and this is not even taking into account any potential biases that might prevent them from adopting measures for which private incentives exist (i.e. individual rationality would suggest taking these measures). On the other hand, if a consumer would conclude that it would be worthwhile striving to save say 100kWh, she might not necessarily know which behaviours could be modified and in which manner in order to reduce her energy consumption by this amount (cf. Dolan & Metcalfe, 2013). Smart meters with RTD potentially address these issues.

3.1.2 Application of Results from the Literature Study

As indicated in the previous section, core features of both smart meters with indicative energy statements and RTD are their information/feedback, communication and (self-) monitoring functions. The following conclusions are drawn from recent studies (discussed in Section 2.3.1) that have analysed the effects of devices such as (indicative) energy statements and smart meters with RTD on consumers' energy conservation.

Information and feedback are provided by both smart meters with RTD and indicative energy statements, but the precise functionalities differ and so do, to some extent, the empirical results. Feedback through enhanced billing programs and ***indicative energy statements*** is estimated to generate energy savings in the order of 2% at the aggregate level (Ehrhardt-Martinez et al., 2010). For the specific case of the Netherlands, KEMA has forecasted energy savings on the order of 3,2% (electricity) as part of a cost-benefit analysis of smart meters when combined with bi-monthly indicative energy statements. Especially when accounting for the low costs associated with such programs, they constitute an effective and efficient means of providing consumers with meaningful feedback about their energy consumption. A recent study by Dolan and Metcalfe (2013) is directly related and highly instructive, especially as it also addresses the critical issue of ***online or web-based services***. vs. offline provision of feedback. The disappointing results from their first large-scale natural field experiment regarding the low effectiveness of online feedback are particularly noteworthy in view of the substantial enthusiasm for the online handling of feedback and information provision services. This enthusiasm is likely to partly be due to cost reasons, and partly to enhanced possibilities of providing tailor-made, frequent feedback. The findings by Dolan and Metcalfe (2013) on the lack of effectiveness of online information/feedback are also in keeping with the results of a large U.K. field study (the Energy Demand Research Project, EDRP) in which none of

the implemented web-based interventions resulted in any energy savings. Lack of engagement (consumers do not actually use the online services) was regarded as the major reason for this failure, rather than an ineffective design of the websites themselves.

In terms of which specific information to provide, the findings EDRP suggest that providing ***energy conservation advice*** may lead to reductions in annual energy consumption of up to 5%, but also that effects are not very robust. In the EDRP study, information on energy conservation was most effective when information provision (on energy conservation measures as well as on ***historic usage feedback***) was minimal but well-presented and easy to absorb. Furthermore, ***benchmarking (comparative or normative feedback including social norms)*** showed even stronger effects than historic feedback. Specifically, only one of the suppliers in the study (SSE) used benchmarking (without any additional devices such as smart meters with RTD devices). The provision of benchmarking information was associated with a significant additional reduction of electricity consumption (compared to trial groups with advice, and groups with historic feedback) of around 1%. This is also in line with Dolan and Metcalfe (2013) who found that when **social norms** were included with the energy statement, energy consumption was reduced over a 15 month treatment period by around 6% on average.

Smart meter with RTD allow for more frequent, more fine-grained, more immediate and more direct feedback. Information provided through such RTD devices, according to prior literature, typically appears to bring about a reduction in energy consumption but percentage savings have been found to vary widely, and appear to depend on climate (and consequently the main uses of energy—cooling or heating, and whether the heating is electric). Also, the initial installation itself appears to trigger a (modest) reduction already, presumably due to the immediacy of the feedback. Results from the EDRP suggest that the pure experience of getting a smart meter with RTD can itself prompt a small reduction in energy consumption. This seems to be particularly true for gas consumption where simple one-off changes (e.g. reducing a thermostat setting) can have big effects on demand. The study also shows that experience of getting a smart meter with RTD is likely to prompt some initial action (e.g. turning down a thermostat) but the effect may require support over time from other interventions (e.g., advice or billing information) to be sustained for longer periods. These findings clearly point at the ***(self-) monitoring function*** of smart meter with RTD.

The EDRP findings for reductions in electricity consumption were generally in line with expectations, based on prior research: They showed a modest effect of clip-on RTDs (a small significant effect of 1% reduction in one trial). Results for main (network) devices with smart meters were in the range of 2-3% reduction for electricity (and even higher in some trials which used more effective devices with 4% overall and even 7% for electricity-only customers). Moreover, the reductions were persistent. For gas, the effects were less clear and generally weaker, with little incremental effects of RTDs on gas consumption above the positive effect resulting from the initial installation of the smart meter (see also below the discussion of smart meter's self-monitoring function). This result is, however, in line with theoretical considerations, that real-time feedback is more relevant for electricity consumption than for gas consumption, as applications of gas tend

to be subject to occasional adjustments with long-term effects. These applications are much less amenable to influence by real-time feedback. In terms of the information displayed by the devices, electricity information attracted more attention than gas information; cost information was generally used and valued more than unit (kW) information. Displays of CO2 emissions were not widely noticed, nor used, nor perceived as useful. Adding to these results, a recent study by Houde et al. (2013) found that reductions in energy consumption were likely to primarily occur during peak household activity periods, but on average did not always persist over time. The overall observation seems to be that direct feedback via an RTD leads to somewhat higher levels of energy savings. In line with this finding, KEMA has forecasted energy savings (electricity) in the order of 6,4% for the specific case of the Netherlands.

Overall, Ehrhardt-Martinez et al. (2010) argue that the most ***effective forms of feedback*** are likely to include both products (e.g., smart meters) and services (e.g., compilation of data, targeting and tailoring of recommendations) that provide consumers with timely and detailed information, which is presented in multiple ways, specifically tailored to the individual household, and contextualized to provide meaning and motivation (e.g., use of social norms—e.g., average consumption of comparable households). However, programs focused on peak load savings generally tend to shift energy use from peak to off-peak periods, but are not very successful in generating energy savings throughout the billing cycle. Programs focused on reducing consumption during specific time periods save substantially less energy than programs which a broader focus on energy conservation as such.

Motivational elements: Incorporating motivational and behavioural elements—such as ***commitments, goal setting, social comparisons, and competitions***—appears crucial to fully exploit the savings potential both in terms of participation rates and magnitude of savings. Despite the evidence of enhanced savings, however, relatively few feedback projects have incorporated these non-economic levers. Among the few such studies is an investigation by Pallak and Cummings (1976) who found that ***public commitment*** promoted gas and electricity conservation among households. The same does not seem to apply for private commitment: In the EDRP study in the UK, ***private commitment*** did not have any detectable effects on consumption. The study by Winett et al. (1982) confirms both these findings.

Overall, the reviewed literature generally suggests that information and feedback interventions have a substantial potential to yield energy savings. However, they are best combined (e.g., smart meters and social norms including injunctive norm information) and the specific design matters crucially in determining both the magnitude and persistence of these effects. This complexity implies that more future research is needed: both for investigating the precise to-be-expected effects of those interventions for which there is more literature already available (e.g., indicative energy statements), and even more so for analysing possible effects and successful designs of behavioural and motivational interventions for which there is little literature to date, such as, for example, commitment, framing, or ranking. Finally, in addition to the need to corroborate, check,

and extend prior research on individual types of interventions, future research will have to focus on the multiplier effects of combined usage.

3.1.3 Application of Experimental Results

Our own experimental findings suggest that by incorporating motivational and behavioural approaches, such as ***commitments, goal setting, social comparisons, and competitions***, households' energy efficiency and curtailment behaviours may be effectively stimulated.

In order to increase savings potential both in terms of participation rates and magnitude of savings, our findings suggest that ***commitment devices*** indeed should not be entirely private, and should be related to immediate, present benefits for the decision maker him or herself as well as to others. This could, e.g., mean that when providing meter readings the consumer is asked for saving goals which would then be included in the ***indicative energy statements*** and are translated into cost savings or reductions in CO2 emissions. ***Including (non-binding) saving goals on Smart meters with RTD*** may serve as a commitment device that is to some extent non-private and closely related to immediate benefits in form of cost savings, and may stimulate households' energy efficiency and curtailment behaviours.

With respect to the inclusion of ***informative and conjunctive norms,*** either on the ***indicative energy statements*** *or on* ***smart meters wih RTD,*** our findings suggest that it is crucial to ensure that the norm cannot be affected by the household's own energy consumption, but at the same time is still psychologically close enough (e.g., energy consumption in the broader neighbourhood). Additionally composing rankings of households or neighbourhoods with respect to average energy savings may even be more effective. These rankings (of neighbourhoods) could be included in the ***indicative energy statements*** or could occasionally be published in local newspapers. Obviously, a careful assessment of privacy aspects would be required.

3.1.4 Example Case Studies: Large-scale Roll-outs of Smart Meters in Ireland and Sweden

As reference for future research, empirical evidence from **large-scale rollouts** in several countries/regions is available from first studies, specifically regarding **experiences with smart meters**.

The case of Ireland. In a recent policy report, Hiscock et al. (2013) report about the experiences made in Ireland from 2009 onwards with the installation of over 6,000 smart meters in private households and businesses as part of a national pilot for a subsequent nation-wide roll-out. This pilot (led by the Commission for Energy Regulation, CER) focused primarily on how energy users responded to smart meter specific efficiency measures by changing (potentially) their energy consumption. Note that these measures were (partly) coupled with time of use (TOU) tariffs and informational stimuli (detailed

energy statements, in-home displays, and so on). Specifically, 5375 private households participated as well as 700 small businesses and commercial enterprises. The specific goals of this pilot were to gauge the potential for smart meters to induce behavioural changes that would reduce or shift peak electricity demand and overall reduce electricity consumption.

In terms of the implementation (field study design) of the pilot (for further details, see Hiscock et al., 2013), four different sets of tariffs (each of them with day, night, and peak rates; all designed as neutral in comparison with the standard tariff such that an "average" participant who did not alter his/her electricity consumption pattern was not penalized financially) and four associated stimuli (monthly and bi-monthly detailed bills, in-home displays, and an overall load reduction reward) were used in the trial with private households. The other three types of stimuli (energy statement, the electricity monitor, overall load reduction incentive) were just as well as the tariffs designed specifically for the trial.

Further, in terms of the study's procedures, all participants in the stimulus test groups received a bill, combined with an energy use statement (first page: bill similar to the existing supplier's bill, with additional lines for TOU tariffs; second page: energy use statement) and additional information on usage and on energy reduction. The majority of participants received this energy statement on a twice monthly basis. One grouping however received the statement more frequently, that is, on a monthly basis, in order to test for the effect of frequency. The electricity monitor (also referred to as in-home display), was designed to provide additional information on how much electricity consumers were using and how much it was costing them. The electricity monitor also included a budget setting mechanism, where consumers could set a maximum they wanted to spend on electricity per day. A usage bar on the home screen showed consumers their usage against their daily budget. For this purpose, prior to installation of the smart meter, historical daily consumption of each participant had been calculated and converted into a monetary value based on the new tariffs. Participants also received further information (fridge magnet, sticker), outlining the different time-bands and cost per band, customized for each tariff group.

In order to establish benchmark information on use and costs of energy, data collection (half-hourly basis from the smart meters) started in July 2009 for six months. In the beginning of 2010, the behavioural stimulus trials began and were run for the full year 2010. During this period, participants were in either a test group or the control group.

In terms of results, the study delivered the following key findings with respect to smart meters in particular: Smart meters with an in-home display reduced energy consumption by 3.2% overall and by 11.3% at peak times. Monthly detailed information statements (instead of bi-monthly statements) delivered significant reductions of 2.7% and 8.4%, respectively. In terms of cost-benefit analysis, the estimated total net present values (NPVs) of the interventions were generally positive. However, the report by Hiscock et al. (2013) does not provide any more detailed information on this issue. Based on the results

from the pilot study, in July 2012, the CER announced that there would be a national smart meter rollout.

Anecdotal evidence surrounding the pilot provides further insights into obstacles for consumers' energy conservation. For example, apparently, consumers had difficulty in accurately estimating their actual cost reductions and tended to have exaggerated expectations of savings (and similarly exaggerated expectations of cost consequences). Specifically, 40% of participants in the pilot who believed that they had reduced their usage simultaneously felt that reduction in the bill was not to the degree they had expected.

The case of Sweden. In the aforementioned policy report, Hiscock et al. (2013) also provide information on Sweden's large scale installation of Advanced Meter Infrastructure which started in 2003, with the aim that by 2009 all electricity customers should have monthly billing based on actual consumption from monthly meter readings for private households and small businesses. Overall, a full scale installation of AMR/AMI systems was implemented for nearly all Swedish consumers (5.2 million) at a total cost for the full roll out of approximately €1.5 billion.

The Swedish AMR/AMI system architecture consists of the smart meters, data collectors and the network company's data management system for billing. Over the six years of the roll-out, the smart meter technology advanced significantly. As a result, different types of smart meters have been installed throughout Sweden over this period. In 2012, a bill was passed in the Swedish parliament which required hourly metering at no extra cost for any consumers who would subscribe to an hourly-based electricity supply contract. Note that there was no regulation with respect to the specific functionalities of the metering system. Instead, the use of smart meters rather became a consequence of the regulation for billing based on actual consumption, as this has been argued to require automatic and remote meter reading. Since July 2009, customers receive monthly bills based on their actual consumption, as opposed to energy statements on a yearly basis with billing based on the previous year's consumption. Furthermore, it is interesting to note that there was not much public opposition to the Swedish smart meter roll-out, neither from energy companies nor from consumers (e.g., about data accuracy and privacy).

The roll-out triggered substantial increases in consumer awareness for energy conservation, following the move from annual meter readings to monthly readings. In terms of energy corporations, the experiences of Vattenfall can be considered as instructive. Vattenfall is Sweden's largest network operator and began with the roll-out in 2003. Between 2003 and 2008, they installed 860,000 smart meters for private households and small businesses. In retrospective, their assessment of this roll-out has been that it delivered more network benefits than expected, for example in the following areas: reduced customer complaints due to improved customer service experience with increased transparency; reduced costs from remote connect/disconnect switching (e.g., empty apartments or overdue accounts can be disconnected efficiently); power outage compensation; low voltage (LV) network quality monitoring due to more accurate network documentation.

3.2 Instruments Targeted at Firms and Managers

Long-term Agreements (LTAs) [30]

Since the early 1990's, the Dutch government has been making long-term agreements (or covenants) with various industrial and non-industrial sectors as part of Dutch energy policy. In particular, as of 1 November 2007, the Sustainability Accord (*Duurzaamheidsakkoord*) between the national government and the business community was agreed upon, stipulating a need to pursue an active and progressive climate policy in the Netherlands and in Europe. This Sustainability Accord forms the framework into which additional concrete long-term agreements for various sectors such as built environment, energy, industry, traffic and transport, agriculture and horticulture, are embedded and for medium-sized and small businesses. These *voluntary* long-term agreements (LTAs), aim at improving energy conservation in the Netherlands. Specifically, the goal is to substantially reduce the required energy per unit product or service. The current LTAs cover the period 2005 to 2020. Of specific interest for this report is the sector accord Industry which forms part of the Sustainability Accord. The sector accord Industry entails two types of long-term agreements (which together are henceforth referred to as LTAs) that apply to different firms:

(1) The "Long-Term Agreement on Energy Efficiency for ETS enterprises" (LEE Covenant) covers about 100 companies that are obliged to participate in the European system of trade in greenhouse gas emission rights (ETS enterprises). These are typically larger energy-intensive companies.
(2) The "Long-Term Agreement on Energy Efficiency" (LTA3) covers about 1,000 for organizations not participating in EU emissions trading, i.e. non-ETS-enterprises. These are typically medium-sized and even some smaller companies. Unlike the LEE, the LTA3 contains concrete objectives relate to specific percentage improvements in average energy efficiency over the course of the agreed upon time period.[31]

The current covenant agreements were signed in 2008 (LTA3) and 2009 (LEE) and cover the time period up to 2020. The LTAs were signed by two Government Ministers (a: Economic Affairs and Infrastructure & Environment), the provincial authorities, the Association of Dutch Local Authorities (VNG), the participating enterprises and relevant

[30] This section is based on the documents "Long-term Agreement on Energy Efficiency for ETS enterprises (LEE)" (October 2, 2009); "LTA3—Long-term agreement on energy efficiency 2001-2020" (2008); "LTA: Long-Term Agreements on energy efficiency in The Netherlands" (2011); "Covenants results brochure concerning long-term agreements on energy efficiency" (2012).
[31] For example, as part of the LTA3, the following objectives have been agreed upon: an average Energy Efficiency Improvement for the relevant facilities of the participating enterprises of 30% in the period from 2005 to 2020. Out of these 30%, 20 percentage points should be realized within the Facility and 10% outside of the facility.

trade organizations. In total, more than 1,000 firms from over 40 sectors have signed the LTAs so far. The overall energy consumption of these companies is approx. 839 PJ, which is equivalent to around 80% of total industrial energy consumption in the Netherlands, and around 25% all energy consumption in the Netherlands. The overall energy consumption of the companies covered by the LEE covenant is approx. 600 PJ (which therefore constitutes a large part of the overall sum of 839 PJ).

From a *procedural* perspective, it is important to note that the LTAs involve three different procedural elements and phases. The first stage concerned the initial setting up and signing of the agreements by the involved parties.

Second, the LTAs imply an obligation for participating firms to draft an Energy Efficiency Plan (EEP) for its facilities every four years, and to implement these plans. The EEPs map out the enterprise's energy efficiency goals, the intended measures to be employed, and a schedule for reaching these goals. Specifically, the minimum requirement in terms of content is that an EEP includes an overview of:

(1) possibilities for adopting "profitable measures" at existing facilities at the time of joining and the result of those measures, expressed in the percentage of energy efficiency improvement per year and the avoided CO_2 emission related to that;
(2) the goal for the energy efficiency improvement (and the avoided CO_2 emission related to that for ETS enterprises) during the period to which the EEP applies, including an indication of which measures are to be taken at which time.

Note that "profitable measures" in the LTAs are defined as measures "that have a positive net cash value at an internal interest rate of 15 percent", or, "alternatively, a cost recovery period of 5 years". These measures may include simple measures such as, for example, automatic lighting regulation that automatically switches off lights at night or insulation of cables. Firms should take into account not only measures that directly improve energy efficiency at their own facilities (energy improvements *within* the company's own production process), but also chain efficiency and renewable energy (i.e., *energy management* that relates more broadly to a firm's striving for product and supply chain efficiency).

Third, participation in the LTAs goes beyond compliance with regulations. The EEPs are tools for planning internal processes. For example, the EEPs list when which specific measures will be taken within the period of the EEP (see above). The company is then required to (self-)monitor whether these measures are implemented on time, and which progress is made as a result of the implementation. This (self-)monitoring element implies that the participating firms oblige with an annual reporting requirement. Specifically, for example, ETS enterprises need to provide explicit justification ("give sound reasons") in case the result of the annual monitoring round indicates that the achieved energy efficiency improvement is less than the planned one as indicated in the EEP. Generally, every participating firm has to submit an annual report before April 1st to a so-called competent authority, i.e., the corresponding public agency that is the competent authority for the relevant facility. This annual report details the progress made

over the course of the previous calendar year with the implementation of the EEP. The annual reporting requirement includes completion of an energy management checklist and its submission to the independent expert agency (AgentschapNL) before April 1st of each year. In addition, every year, the independent agency orders a random audit of a sub-sample of participating firms. Initially, reporting requirements in the annual report related to the following elements:

- Energy Efficiency Index (EEI) = quotient of the energy consumption in the year under review and the energy consumption that would have been required to realize the same production volume with the specific energy consumption for the products concerned in the reference year, as well as the CO2 emissions avoided as a result;
- Renewable Energy Index (REI) = the level of deployment of renewable energy;
- Energy Efficient Product Development Index (EEPDI) = a measurement of improvement in energy efficiency;
- efforts made (projects implemented) in relation to the activities planned;
- total fossil fuel energy conservation of the enterprise expressed as a single index (Total Energy Efficiency Index, TEEI), which consists of the EEI (related to process improvements), EEPDI (related to product development improvements), and REI (related to deployment of renewable energy).

Importantly, in practice, implementation of and monitoring based on this fairly complex set of indices proved difficult. As a result, they were replaced by a system in which energy conservation is assessed based on the specific measures adopted by a firm ("genomen maatregelen").

Based on firms' submissions, the independent expert agency (*AgentschapNL*) aggregates the data from the enterprise monitoring reports and reports every year by June 1st to the relevant Energy Conservation Consultative Group, in aggregated form, about the energy conservation progress during the previous calendar year with regard to the implementation of systematic energy management measures; the implementation of EEPs; the energy efficiency improvement realized through the former two parts; the CO2 emissions avoided as a result of the former two parts. It is important to note that deviations from EEPs may give rise to re-negotiations and/or the conclusion of additional agreements. Importantly, the resultats have to be sent to the "Tweede kamer" each year in September.

In terms of results, for the year 2011, firms under the LEE covenant have undertaken measures that together have resulted in annual savings of some 9.6 PJ (equivalent to the annual energy consumption of approx. 150,000 Dutch private households). LTA3 firms over this time period contributed annual energy savings of 6.7 PJ (equivalent to the energy consumption of approx. 100,000 Dutch private households.)

Finally, it is important to note that the sketched long-term agreements rest on the assumption of voluntary participation, rather than regulation that obliges firms across the board (e.g., mandatory adoption of energy conservation measures).[32]

3.2.1 Relevant Features of LTAs

Unlike the previous two instruments, the (indicative) energy statements and smart meters, which address energy efficiency in the domain of private households, the LTAs relate to organisations and managers acting on behalf of these organisations.

From a policy-making perspective, core features of the LTAs as policy instruments for fostering sustainable decision-making are their (self-)monitoring, commitment, and goal setting features.

As a self-monitoring device, they force firms to take stock of their current practices in the domain of energy use. This implies, first, that firms have to gather the relevant internal and external information on both the status quo as well as potentially energy-saving (future) investments. Second, the annual reporting requirements force firms to continuously assess the development of their energy consumption. Third, importantly, the LTAs also imply that firms need to consider and improve energy efficiency along the value chain. That is, downstream firms, for example, are explicitly encouraged to include in their (self-)monitoring efforts the energy efficiency of their suppliers as upstream firms.[33]

As a monitoring device, the LTAs and the implied annual reporting requirements provide governmental agencies with the necessary information to monitor firms' progress in the domain of energy efficiency; enable dialogue between firms and the government and inform policy-makers about specific challenges that firms may face and that may arise and lead to deviations from plan; and—at least in theory—enable governmental agencies to assess the relative performance of firms in terms of improving their energy efficiency.

As commitment devices, the LTAs enable firms and the managers that are heading them to overcome procrastination challenges and barriers to investing in future energy saving measures. However, it also has to be noted that the manner in which the LTAs are currently set up (e.g., little exogenous guidance in and fairly non-ambitious requirements for the formulation of the initial energy efficiency improvement plan), implies that firms have an incentive to *not* aim high in their plans for energy efficiency progress. Instead,

[32] It should be noted that organizations that participate in the LTAs ("MJAs") are entitled to a (limited) exemption/(partial) refund of their energy tax for electricity consumption ("Energiebelastingteruggaaf") that is linked to their participation in the LTAs.

[33] The inclusion in the LTAs of requirements for firms to take into account in their self-monitoring chain efficiency recognizes the difficulties associated with capturing such a comprehensive perspective in detailed regulation. Based on individual regulation, firms can only be obliged to undertake measures directed at improving process efficiency within the individual firm. The LTAs allow for including an overarching value chain obligation.

they have an incentive to formulate decidedly non-ambitious goals in order to make sure that they have a good chance of fulfilling the plan (commitment) over the subsequent years to which the LTA applies.[34] In recognition of this potential problem, the plans are get evaluated and, if judged to be too non-ambitious, discussions with the firm are initiated. In case of a negative outcome of these discussions, the firm could ultimately be excluded from the convenant. Regarding the LTAs function as ***goal setting devices***, it is important to take into account the processes that underlie the setting and adaptation of corporate goals. In particular, the organizational behaviour literature has related learning processes and adjustment of behaviour to aspiration levels (goals of the organization).

Following March and Simon (1958), a basic assumption of many models of organizational behaviour is that individuals and organizations learn and adjust their behaviour in response to experience. The main assumption made is that organizations set goals and adjust behaviour in response to favourable and unfavourable feedback in accordance with simple decision rules (Cyert & March, 1963). The role of goals, or aspiration levels, is a critical part of these models (Lant, 1992) and aspirations determine whether past performance is framed as a success or failure, thus influencing the interpretations of the managers and subsequent organizational behaviour (Lant, 1992). Two major determinants of the formation and adaptation of organizational aspiration levels are historic feedback on a firm's own past actions (similar to the historic feedback about a private household's own past energy consumption), and feedback related to social comparisons, that is, the actions of a firm's relevant peer group (similar to the benchmarking by providing private households with information about comparable neighbors' average energy consumption).

3.2.2 Applications of Results form the Literature Study

Compared to studies on stimulating energy conservation among private households, research dealing with the stimulation of energy conservation by firms and organizations is much more limited.[35] The following lines of arguments do, however, emerge clearly from this limited body of literature (see Section 2.3.1 and Appendix A.4 for more detail).

First, the profit motive is likely to drive firms more strongly to overcome inertia in the adoption of cost-saving energy conservation measures. However, prior research has identified substantial barriers to firms' investment even in such cases (Maon et al., 2009). These barriers together result in a serious implementation gap with respect to investments in energy-saving technology. In fact, the observation that firms do not always implement profitable investments in energy-saving technology constitutes one of the most pervasive anomalies in energy economics.

[34] First effects of introducing LTA's as goal setting devices can already be seen in the increased energy efficiency of approximately 25%, recently published by Dutch universities.

[35] There is, of course, the vast literature on Corporate Social Responsibility (CSR). Covering this literature extensively is beyond the scope of this report. However, we do summarize main lines of research in this area here in as far as they are relevant for the current research project.

Second, competition and the need to justify decisions towards shareholders imply that investments in energy conservation measures that are not actually cost-saving but require firms to sacrifice some of their profits face even higher barriers—unless, that is, failure to implement socially desirably investments in energy conservation becomes a threat to profits, too, by hurting a firm's reputation and relative standing. A firm's reputation combines everything that is knowable about a firm. As an empirical representation, it is a judgment of the firm made by a set of audiences on the basis of perceptions and assessments that are assembled and made available via a ranking system, which defines, assesses, and compares firms' reputation according to certain predefined criteria (Schultz, Mouritsen & Gabrielsen, 2001). While the exact profit implications of a firm's reputation and of any damage to it may be difficult to gauge, prior literature tends to agree that a positive reputation, that is, a relatively better standing and image of a firm compared to its relevant competitors, constitutes an asset that can generate future rents and above-average profits in the medium and long run (e.g., Roberts & Dowling, 2002; Weigelt & Camerer, 1988; Fombrun & Shanley, 1990). Profit-oriented firms can, therefore, be assumed to care about avoiding damage to their reputation and image.

External sources (e.g., media, governmental regulation) provide valuable feedback to firms about the extent to which society values energy-efficient behavior of firms and the degree to which, in turn, failure to engage in energy conservation may hurt a firm's profits by damaging its reputation. However, given difficulties in operationalizing the concept of reputation, and in view of the typically qualitative nature of feedback provided, for example, by media coverage, it is difficult for firms to gauge the optimal amount of investment in non-cost-saving energy conservation technologies. Unambiguous indicators of relevant benchmarks can, therefore, help firms substantially in their assessment of their relative position vis-à-vis their peers, and, hence, their reputation. An example is the Dow Jones Sustainability Index (DJSI) family. In 1999, the Dow Jones Sustainability World Index was launched as the first global sustainability benchmark.[36] The family of indices tracks the stock performance of the world's leading companies in terms of economic, environmental and social criteria. In essence, they provide a ***ranking*** with respect to these criteria and thereby convey ***social norms*** among relevant peers (e.g., competing firms in the same industry). Companies appear to take their relative position in these indices seriously. Anecdotal evidence shows that, for example, automobile firms like BMW extensively use information on their position in the sustainability index in advertising. Indeed, more generally, Cho, Guidry, Hageman, and Paten (2012) showed that a firm's DJSI designation was positively associated with perceptions of corporate reputation.

The social norm expressed in the DJSI ranking, therefore, contains information about the opinions and performances of peers. As such it acts as important feedback factor for the past behavior of the firm, relative to its competitors, and can constitute an important input for adjusting the firm's aspiration level for the next period. As discussed in Section 2.3.1, social norms constitute a promising type of nudge, a type of non-monetary incentive to positively influence energy consumption of individual consumers. The competitive environment of firms, managers' accountability vis-à-vis shareholders and other

[36] See http://www.sustainability-indices.com/index-family-overview/djsi-family.jsp

stakeholders, and managers' greater visibility within organizations and in society all imply that, while non-monetary rewards (such as reputation, image, prestige) or punishments (such as shame) are relevant for all individuals, we may expect equally strong or even stronger effects of relevant social norms on the Behavior of managers who act on behalf of their firms. ***(Public) visibility*** of managerial actions, for example, is something that follows directly from the position of managers' in the hierarchy. Since managers are the most visible members of an organization and outsiders see them as representative of the organization itself, it is their task to present with their actions the organization's core values and purpose to the world (Scott & Lane, 2000). Besides achieving the desired corporate image outside the organization, managers' visibility affects their decisions within the organization itself. A direct relationship exists between power and visibility—the more powerful a manager is, the more visible his or her actions will be (Ortega, 2003). Therefore, it seems likely that for any type of ranking nudge or social norm to affect managers' decisions (by affecting reputation, self-image and perceived status) public visibility is crucial. Prior evidence suggests that, indeed, "naming and shaming" tends to have a positive effect on pro-social Behavior in general. Besley, Bevan, and Burchardi (2009) analysed the effect of a "naming and shaming" approach used in 2001 to reduce long waiting lists for hospitals in England. They found that this policy did indeed reduce waiting times.

However, overall, despite the importance of the issues, and compared to the literature on the effects of nudges on energy-related behaviors of private households, there is very little prior research on the impact of non-monetary incentives such as, for example, social norms and rankings, on managers' striving for energy conservation.

3.2.3 Application of Experimental Results

Our own experimental findings suggest that by incorporating motivational and behavioural approaches, such as ***commitments, goal setting, social comparisons, and competition***, into the various phases of the long-term agreements (LTAs) may effectively stimulate organisations energy efficiency and curtailment behaviours.

At the first stage of the initial setting up and signing of the LTAs by the involved parties, already serves as ***public commitment*** and ***goal setting*** and already seems to have positive effects on organisations' energy efficiency. Our experimental results suggest that the more these goals are formulated in terms of net present values, the larger is the expected psychological effect on the managers' decision making in the implementation phase.

Our results further suggest that confronting top managers with an informative and conjunctive industry ***norm***, and more spefically asking the top management to ***justify the Energy Efficiency Plan (EEP),*** in comparison to such a ***norm***, in writing or speaking towards relevant stakeholders may have an additional positive effect. At the first stage of the initial setting up and signing of the LTAs, these stakeholders may be the Government Ministers, the provincial authorities, the Association of Dutch Local Authorities (VNG), or relevant trade organizations.

This ***justification*** could also be included in the reporting requirements in the annual report submitted to the independent expert agency (AgentschapNL). This independent agency should, next to conducting random audits of sub-samples of participating firms, also be able to compose ***rankings*** of organisations (within their relevant industries) with respect to achievments. The anticipation of such rankings, ***published at random points of time***, may induce extra energy efficiency and curtailment behaviours.

4. Conclusion

While the global challenges related to sustainability are manifest, defining how governments can meet the challenges is a daunting task. Sustainability encompasses a broad range of issues, it involves the interaction of a broad range of decision makers, and it includes all parts of the world. If there is any agreement, then it is on the insight that behaviour collectively needs to change towards more sustainable, and more pro-social decision-making. In stimulating more sustainable and more pro-social decision-making, attention has turned away, in recent times from the creation of price incentives and disincentives (monetary rewards and punishments, e.g. subsidies) towards non-price interventions such as making sustainable decision alternatives the 'default' choice, rather than requiring deliberate opt-in. This development rests on a growing body of academic research in behavioural economics and psychology which suggests that non-monetary incentives can potentially be just as powerful as prices in changing choices and behaviour—and potentially much less costly.

Understandably, this idea has attracted the attention of policymakers, as the prospect of enhancing sustainable decision-making, both more effectively and efficiently, is compelling, especially at times of fiscal constraints. Policy should be based on sound research and avoid applying non-price interventions without good evidence of whether the measures they introduce do in fact work. Unfortunately, until now only scattered evidence from laboratory experiments and isolated field studies is available. Without further research, getting it right might be the result of luck rather than foresight.
In the light of this, the present study specifically focused on sustainable decision-making to increase energy conservation. It aimed at (1) improving upon existing studies by taking stock of the current state-of-the-art in the field and, on that basis, suggesting and testing ways in which non-price interventions ('nudges') that have shown or argued to be promising can be further improved upon in their effectiveness. Furthermore, the study aimed at (2) incorporating new insights from recent psychological research that have not been analysed in this domain. And finally, (3) the behaviour of individuals that are in a "managerial" position received special attention.

An overview of the main findings and conclusions of the present study is presented in Tables 2, 3 and 4 below. The literature is rather extensive regarding studies that analyse the effects of various nudges on energy efficiency of households. A translation—of both these findings and our own laboratory results—to the specific instruments that were

identified to be of immediate relevance for the Dutch context[37] leads to the main conclusion:

Information, feedback, and monitoring features of the bi-monthly (indicative) energy statement and the smart meter can possibly be used to increase energy conservation efforts.

The following general do's and don'ts for stimulating energy conservation can be tentatively summarized:

- Emphasise ***present*** benefits of energy efficient behaviour for the individual in order to avoid strong discounting.
- Emphasise present benefits of energy efficient behaviour for ***close*** others to reduce social, temporal, and spacial distance—perceived distance drastically decreases pro-social decision-making.
- Don't use "cheap talk" commitment—rather introduce a small (social) cost for not living up to the commitment (goal setting), i.e. ***public (costly) commitments***.
- Use ***informative and injunctive social norms*** in explicitly ***non-strategic settings***.
- Use ***rankings*** in explicitly ***strategic settings***, i.e. when actors can influence the norm itself.
- Use ***offline***, not online delivery of feedback information. Online feedback has shown to have low effectiveness.
- Apply the ***KISS-principle*** when providing information: Information must be easy to grasp and immediately relevant. Information on energy conservation, for example, is most effective when only a minimal amount of information is provided but it is well-presented and easy to absorb.
- ***Emphasize cost information*** rather than energy unit savings information: Cost information generally attracts more attention and is valued more than unit (kW) information.
- If the goal is to save energy: Do not focus on savings during specific time periods – such campaigns tend to shift rather than reduce overall consumption.

With respect to nudges affecting energy efficiency of firms, there is hardly any literature available at present. Own experimental results indicate that it might be possible to use the LTA's that are signed by top managers and organizational leaders to implement relevant non-price interventions: In the experiments, accountability and a need to justify one's decisions vis-à-vis others (visibility) made decision-makers particularly susceptible to the positive impact of social norms on pro-social decision-making, that is: these features increased the power of social norms substantially. While future research is needed to corroborate these results, the findings suggest that designing nudges that combine a salient and public need for justification with feedback on social norms may substantially increase pro-social choices of individuals in managerial positions.

[37] This refers to instruments that are under the direct or indirect influence of the EZ.

The following do's and don'ts for stimulating energy conservation by ***firms and organizations*** can be tentatively summarized:

- Use ***informative and injunctive social norms*** for (top) managers of firms.
- Let (top) managers of firms ***justify*** (explicitly, in regular intervals, and in a form that directly links the person with the content (e.g., in writing or speaking; rather than signing only); with public visibility) their energy-related investment decisions.
- Use the ***anticipation effect***—anticipation of being ranked works almost as well as the experience of being ranked.

The application of behavioural economic theory in policy making is not without its critics. Some deride it as manipulative and paternalistic. But even under the most positive perspective, there is little reason to believe that policies that are inspired by research on behavioural patterns observed in the laboratory would be successful in the real world, and that behavioural patterns observed in isolated field studies in one country are relevant for other countries. There are several reason to assume that causal mechanisms may not be transposable (due to cultural differences, or because the specific context matters, or because of unintended side effects when transposed to other contexts). Only (randomized controlled trial) field studies in the Netherlands that (1) study behaviour for a longer period, and that (2) use nudges that are related to the discussed instruments and consciously designed, will allow to draw quantitative conclusions about the potential effect on changes in energy efficiency of such non-price interventions.

Instrument: Smart Meters with Indicative Energy Statements[38]

Relevant nudges	Results from the literature review[39], laboratory experiment, and case studies	Unresolved questions	Implications for further research
Informa-tion feedback	• Consumption feedback through advanced billing practices has a positive effect (max 11% in the field, and max 20% in lab). • Saving advice has a positive effect (max. 5% in the field). • Information provided on-line has no significant effect, unlike offline information provision which has a significant positive effect. • Information needs to be provided timely, minimal but well-presented and easy to absorb. • Information needs to emphasise savings/benefits in the present.	It is not clear how to reach those consumers who are least interested, as information can easily be ignored. Probably a combination of very specific advice and related monetary consequences (potential gains and losses from change in behaviour) may be effective, e.g. "You are currently losing €x each month by not consistently turning off your light." The aim should be to change habits in order to achieve lasting effects.	The analysis of data provided by the first roll-out in comparison to control group will give insights about the saving potential in the Netherlands. Market research should reveal how information can be provided in an effective and efficient way, and how awareness of energy consumers is best stimulated.
Commit-ment and goal setting	• Private commitment has positive effect (max 12% in the lab). • Public commitment (e.g. signed statements) has moderate positive effect (max 15% in the field). •	Voluntary commitment to specific saving goals could be included in subsequent indicative energy statement, but it is not clear whether this will lead to a lasting effect i.e. change of habits.	Randomized controlled trial field studies in the Netherlands using commitment and goal setting.
Social norms	• Social norms reduced energy consumption (2%-6% in the field) • Informative and injunctive norms have no significant effect on individuals in strategic settings (in the lab)	Which social norm is perceived as "relevant" is difficult to predict. Individuals may identify with the immediate neighbourhood or with demographically similar households.	Survey to identify relevant norms. After that, randomized controlled trial field studies in the Netherlands using the identified norm(s).
Ranking	• Public rankings increase pro-social behaviour of individuals in strategic settings (max. 15% in the lab).	Addressing individuals' image concerns ('naming and shaming') has potentially large and lasting effects. It may be effective to rank smaller communities (e.g., neighbourhoods, postcode areas) instead of individual households and publish rankings regularly in	Laboratory study to test public ranking of groups vs. control groups, and compare to effect of ranking individuals within groups.

[38] Estimates for the effects of different nudges on energy saving vary dramatically. In this tabel we report average effect sizes. In doing so we applied two principles: 1) There where studies report large differences the reported numbers are based on the most representative research. 2) Within a group of representative studies we chose not to weigh studies but rather report the maxima of the average effect sizes found in these studies. Findings are also applicable for comparable kinds of instruments with *indirect* feedback.

[39] The results from the literature review include findings from prior laboratory studies as well as field studies and field experiments.

		local newspapers.	
Framing	• Precise framing (e.g., presentation) matters crucially and can make or break the effectiveness of the particular nudge. • Deviation from norm could be framed in (monetary) losses, should have a positive effect (no evidence yet).	The effect of feedback information depends crucially on the precise presentation. Not living up to a goal, or consuming more than the norm could be communicated in terms of losses, e.g. "You spent €x each month more than the average household in your neighbourhood".	Survey to identify relevant norms. After that, randomized controlled trial field studies in the Netherlands using the identified norm(s) with different frames.

Table 2: Main research findings with specific relevance for instruments: Indicative energy statements

Instrument: Smart Meters with Real-Time Display[40]

Relevant nudges	**Results from the literature review**[41]**, laboratory experiment, and case studies**	**Unresolved questions**	**Implications for further research**
Informa-tion feedback	• Installation of smart meter has a small non-lasting effect (max. 5%). • Consumption feedback via RTD has a positive effect (max. 8%). • Installation of smart meter reduces customer complaints due to improved customer service.	Consumers need to see an effect of their energy savings on their energy bill to achieve lasting effects.	If technically feasible, during the next rollout in the Netherlands an RTD should be provided and the effects of the inclusion of an informative (and preferably also injunctive) social norm should be tested against a control group (randomized trial field study).
Social norms	• Informative and injunctive social norms should have a positive effect (no evidence yet).	Which norm is perceived as "relevant" is difficult to predict (see above).	
Framing	• Deviation from social norm could be framed in (monetary or kW) losses, should have a positive effect (no evidence yet).	The effect of feedback information depends crucially on the precise presentation (see above).	

Table 3: Main research findings with specific relevance for instruments: Smart meters

[40] Estimates for the effects of different nudges on energy saving vary dramatically. In this tabel we report average effect sizes. In doing so we applied two principles: 1) There where studies report large differences the reported numbers are based on the most representative research. 2) Within a group of representative studies we chose not to weigh studies but rather report the maxima of the average effect sizes found in these studies. Findings are also applicable for comparable kinds of instruments with *direct* feedback.

[41] Idem.

Instrument: LTAs

Relevant nudges	Results from the literature review[42], laboratory experiment, and case studies	Unresolved questions	Implications for further research
Social norms	• Informative and injunctive social norms increase pro-social behaviour of individuals in managerial positions (max 45% in the lab).	The results were derived from observing students in managerial positions, the representativeness of the findings for managers' decision making needs to be confirmed. Which social norm is perceived as "relevant" for managers is difficult to predict (same industry, similar firm size, country or region-specific etc.).	Survey to identify relevant norms among Dutch top managers. Field experiment to test effects of informative and injunctive social norm information on managers' decision making in simulations of real-life decisions.
Ranking	• Public rankings increase pro-social behaviour of individuals in managerial positions (max 40% in the lab).	The results were derived from observing students in managerial positions, the representativeness of the findings for managers' decision making needs to be confirmed.	Field experiment to test effects of public ranking on managers' decision making in simulations.
Justifica-tion	• Recurring (written) justification of decisions in relation to a social norm should have positive effects (no clear evidence yet).	The results were derived while justification was combined with a social norm. It is not clear to what extent justification alone has an effect. Provided that results are transferable to managers' decision-making: Energy efficiency needs to be high on the agenda of CEOs. Probably only a verbal justification in front of highly ranked policy makers would achieve this effect. It is unclear where in the process of signing an LTA this intervention would be meaningful and feasible.	Laboratory study to test managerial justification contest vs. private justification context.
Commit-ment and goal setting	• The public binding commitment character of LTAs has first positive effects (no systematic evidence yet).		The analysis of data provided by the firms' reports based on first LTAs in comparison to (possibly foreign) control group will give insights about the saving potential in the Netherlands.

Table 4: Main research findings with specific relevance for instruments: LTAs

[42] Idem.

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Appendix A: Literature Review

"Failure to act for the public good has created major social problems. As the population continues to explode, acting in ways that suit our own self-interests – or whims – without considering the consequences for others has led to crisis after crisis: trash-littered public parks, streets, and highways; polluted rivers and streams; dropping water tables and shrinking reservoirs; vanishing rain forests; the continuing slaughter of whales; reduced social services and underfunded schools; free riders who enjoy public TV but do not ante up." Batson (1994, p. 603)

A.1 Foundations of Human Motivation for Pro-Social Behavior

Theories about pro-social behavior have a long history in psychology, and only more recently have been addressed in the field of behavioral economics. In the latter area, researchers look mainly to these psychological theories in order to explain effects that cannot be explained through standard (neoclassical) (micro-)economic reasoning.

A Psychological Perspective

In order to understand the motivation behind several forms of pro-social behavior, such as giving to charity, the underlying principle of goals and unintended consequences needs to be addressed. Batson et al. (2008), analyzing the psychological literature on the subject, state that "if a negative discrepancy is perceived between a current or anticipated state and a valued (desired, preferred) state, then obtaining or maintaining the valued state is likely to become a goal". Using this statement, it is possible to distinguish between ultimate goals, instrumental goals, and unintended consequences. *Ultimate goals* are these valued states that a person is seeking at a given time. *Instrumental goals* are stepping stones towards these ultimate goals, in other words, these are partial goals. *Unintended consequences* are effects of action that in themselves are not goals. In analyzing people's motivation for pro-social behavior, these three broad categories need to be taken into account. Batson et al. (2008) also state that "the more directly a given behaviour promotes an ultimate goal, and the more uniquely it does so among the behavioural options available, the more likely it is to occur". It is, then, the value of the different valued states that directs people towards behaving in a certain way. This direction of one's behavior towards a specific goal is called *motivation*, and the larger the step to the ultimate goal, the stronger the motivation. Lewin (1951) argued that motives are changeable, goal-directed forces, and that, therefore, they can conflict or augment each other.

Following this Lewinian perspective on human motivation, Batson (1994) determined four specific ultimate goals for behaving pro-socially or in favor of a public good. These four goals are (a) egoism, (b) altruism, (c) collectivism, and (d) principlism. They are ultimate goals in that they determine for each specific person the motives that underlie pro-social behavior. As Lewin (1951) stated, these goals can at times augment each other,

and at other times conflict with each other. The conflict arises, for instance, in social dilemmas: situations in which choosing to allocate resources to oneself is going to provide more utility to the individual than allocating those resources to a group, but the total utility can only be maximized by allocating resources to the group. The individual goals present in these situations are discussed in detail below.

*Egoism***.** The most basic and well-supported of goals of behaving pro-socially is, perhaps somewhat paradoxically, egoism. It is defined as benefiting someone else in anticipation of self-benefit. This self-benefit, in turn, has many different forms, as indicated by Table A1. There are three broad categories, each of which has specific examples supported by empirical evidence (Batson et al. 2008). Within the framework of egoism, pro-social behavior thus always exists as an instrumental goal: it is used to receive rewards, avoid punishments, or reduce aversive arousal. In itself, therefore, pro-social behavior is not an ultimate goal in the context of egoism. It is merely instrumental. To illustrate how egoism as an ultimate goal can motivate pro-social behavior, consider the simple example of children only receiving their candy if they share it with their friends. Ordinarily an exercise to teach children how to share, in essence this behavior is motivated purely by egoism: the child promises to share so he can get candy himself. In Table A.1, this example would fall under 'Gifts' in the first distinct category. This simple form of egoism, however, is not very prevalent in the realm of adult life. There, more subtle forms of egoism are predominant. One such subtle form of egoism is that of avoiding social sanctions for norm violation. If a specific form of pro-social behavior, such as cleaning up a shared kitchen, is considered as the norm, violating this norm is usually met with certain social sanctions, such as exclusion or gossip. Another example of a subtle form of egoism is that of mood-enhancement. Cialdini et al (1973) and Isen (1970) argued, respectively, that people behave more pro-socially both when they are in a negative mood (enhancement) and when they are in a positive mood (maintenance). In this way, behaving pro-socially can be motivated by trying to feel better or avoiding to feel worse.

1. Receiving material, social, and self-rewards		
	Payment	Praise
	Gifts	Honor
	Reciprocity credit	Enhanced self-image
	Thanks	Mood enhancement
	Esteem	(maintenance)
	Heaven	Empathic joy
2. Avoiding material, social, and self-punishments		
	Fines/imprisonment	Recrimination
	Attack	Sanctions for norm
	Hell	violation
	Censure	Shame
		Guilt
3. Reducing aversive arousal		
	Escape from distressing situation	

Table A.1.Possible self-benefits from benefiting another person (adapted from Batson et al., 2008)

While the specific goals in the first two categories are relatively clear-cut, the goals in the last category (see Table A.1), which are referred to as "escape from unjust situation", demand more specific attention. This goal is derived from Lerner (1980), who stated that "all people that we consider normal, i.e. are able to function in their respective society, develop a certain just world view" (p. 137). This just world concept is the idea that people always feel the consequences of their actions, or, as Batson et al. (2008) state "people get what they deserve and deserve what they get" (p. 137). The people that have a high belief in a just world see unjust situations as aversive, and thereby try to escape from it. They do this either by rationalizing victimization (i.e. giving an explanation that would fit with their view) or by actually engaging in pro-social behavior.

Experiments on this subject by Miller (1977a, 1977b) have shown that people are more likely to opt for the pro-social behavior when they perceive the problem as solvable and when they perceive their actions as having a large impact towards solving the problem. In an applied way, this is a matter of framing the problem in such a way that the actor believes the problem can be solved through pro-social action and that he actually can exert a significant influence. Consequently, for example, charity organizations have long worked with visual cues that focus on a single person rather than a group, thereby framing the problem of for instance starvation as a solvable problem.

Altruism. This is the 'purest' goal linked to pro-social behavior in the sense that here pro-social behavior itself is the ultimate goal, and not an instrumental goal or an unintended consequence. The existence of altruism and measurement thereof is debatable: even though altruism might exist, one will always tend to feel pleasure by helping others. This pleasure can either be an ultimate goal (egoism), or it might be a by-product of the

ultimate goal of altruism. The two possibilities are separated merely by a differing assumption of hedonism: Advocates of egoism assume a strong form of hedonism: attainment of personal pleasure is always the goal of human action. Therefore, true altruism exists only as an illusory by-product of one of the egoistic reasons for helping others. Advocates of the existence of 'true' altruism, on the other hand, assume that only a weak form of hedonism exists: attainment of personal pleasure is, in itself, a *result* of goal attainment. It is therefore compatible with the idea of altruism: even though people feel better by helping others, this is not necessarily their ultimate goal. The most influential hypothesis behind the existence of altruism is called the "empathy-altruism hypothesis". According to this hypothesis, "purely altruistic action can occur reliably, provided that it is preceded by a specific psychological state: empathic concern for another" (Cialdini et al., 1997: p. 481). Empirical evidence for the existence of empathy in itself is strong, naturally, with research spanning several academic fields besides psychology. In addition to supporting the mere existence of empathy, psychological literature also supports the hypothesis that empathy might play an important role as a motivator of pro-social behavior (see Eisenberg & Miller, 1987 for a review).

The difference between the empathy-altruism hypothesis and several egoistic motivation based hypotheses, the largest of which is the aversive-arousal reduction, is in the direction of causality to personal pleasure. While the empathy-altruism hypothesis proposes that pleasure is a result of altruism, the latter ones suggest that altruism is a result of the desire for pleasure. This is in essence a rephrasing of the discussion described above. Observing behavior, however, can never be the perfect measure for underlying constructs of motivation: an action can be motivated by egoism, altruism, or both (Batson et al., 2008). Even though the concept is hard to test, the literature supports the empathy-altruism hypothesis marginally better than the egoistic alternatives. The tentative conclusion can then be drawn that there is indeed such a thing as 'true' altruism.

The empirical support for both collectivism and principlism as underlying goals of pro-social behavior is less strong than for the aforementioned two types of goals.

Collectivism. Collectivism implies that the ultimate goal of pro-social behavior could be benefiting a group of people of which the actor is part. Here, too, the dilemma arises: are pro-social actions truly motivated by collectivism, or merely by a subtle form of egoism? To date the literature on this question is ambiguous (Batson et al., 2008).

Principlism. The ultimate goal for pro-social behavior that is associated with principlism is that of upholding (abstract) moral principles. The hypothesis underlying this motive is that humans act in a way that is good for the public because they hold a set of moral principles, such as "it is bad to litter the park" or "it is my duty to vote", and they wish to uphold these motives (Batson, Ahmad, & Tsang, 2002). Again, mere observation cannot give unambiguous conclusions on whether this motive in fact exists, and the actions that seem motivated by principlism can also be explained by subtle egoism. For instance, the egoistic motive associated with Lerner's (1980) just world view, as described earlier, could be an explanation in many cases where principlism could apply.

An Economic Perspective

While conceptually, the four sketched types of goals form a comprehensive basic psychologically-motivated model of the motivation behind pro-social behavior, recent economic research has developed theoretical frameworks that closely parallel the one suggested by Batson et al. (2008).

Most prominently, Ariely, Bracha, and Meier (2008) provided an integrative, general view of pro-social behavior motivation from a business and economic policy perspective rather than from a purely psychological perspective. Their theoretical framework draws from classical motivation theory applied to pro-social behavior. According to this theory, motivation in pro-social behavior can be divided into the three broad categories of motivation, that is: intrinsic motivation, extrinsic motivation, and image motivation.

Intrinsic motivation. Intrinsic motivation includes categories such as pure altruism and other forms of pro-social preferences (Ariely, Bracha, & Meier, 2008). In reference to the Batson et al. (2008) framework, this category contains altruism, collectivism, and principlism motives, as shown in the top panels in Figure A1. Intrinsic motivation is assumed not to be influenced by external factors: it is an inherent motivation for or tendency towards acting for the public good.

Extrinsic motivation. Extrinsic motivation has to do with any material reward or benefit associated with giving to others. This category of motives is largely based on the egoism motivation of the Baston et al. (2008) framework, but is not synonymous with it: extrinsic motivation is based more on basic, first-order egoism, such as the material and self-rewards and punishments shown in Table A.1, and does not include the more subtle, often social forms of egoism. Extrinsic motivation, unlike intrinsic motivation, is easily influenced, as rewards are often (but not always) externally regulated. A principal could easily increase the extrinsic motivation of an agent to whom he delegates a task by, for example, adding or increasing a monetary reward contingent on pro-social action.

Image motivation. Image motivation is very important in pro-social behavior, as it is for a large part a determinant of the extent to which the behavior will be performed, as will be discussed in the following sections. Image motivation is otherwise known as signaling motivation, as it has to do with the fact that people are at least partially motivated by other's perception of their behavior. This category of motives can be aligned with the more subtle forms of egoism, those forms that have to do with the social rewards and punishments in Table A.1. For example, one might help a person in need because it is considered to be the social norm: not performing the pro-social action could be met with exclusion. Changing a person's image motivation is harder than changing extrinsic motivation: the image motivation is based on social norms and values, which are relatively stable across time. The saliency of the observation by society, however, is something that can be altered, thereby raising or lowering image concerns in pro-social behavior. A concept mainly prominent in economic sociology, highly related to this last motivational category of image motivation is 'conspicuous consumption' (Veblen, 1899). The idea of conspicuous consumption is that individuals emulate the consumption

patterns of other individuals situated at higher points in the hierarchy, and in this way try to signal a certain status (Trigg, 2001). Consumption is in this case motivated for a large part by the just described image motivation, and is changed according to the social norms that exist. In pro-social behavior, conspicuous consumption can for instance be seen in donations to charity: donating a large amount of money to charity signals a certain selfless, generous character trait that is associated with high social standing.

A Synthesis of the Psychological and Economic Perspectives

Figure A.1 relates to two sketched theoretical frameworks to each other. Note that the model suggested by Ariely, Bracha, and Meier (2008) is more focused on the well-supported different forms of egoistic motives, and less on the debatable motives of altruism, collectivism, and principlism. In the context of influencing the motivations behind pro-social behavior, or changing the relative importance of different types of motivations, the focus should indeed also be on these factors: they are most easily changeable and most clearly defined. In accordance with this statement, Batson (1994) also mentions that egoistic motives as a source of action for the public good shows promise because they are easily aroused and they are potent.

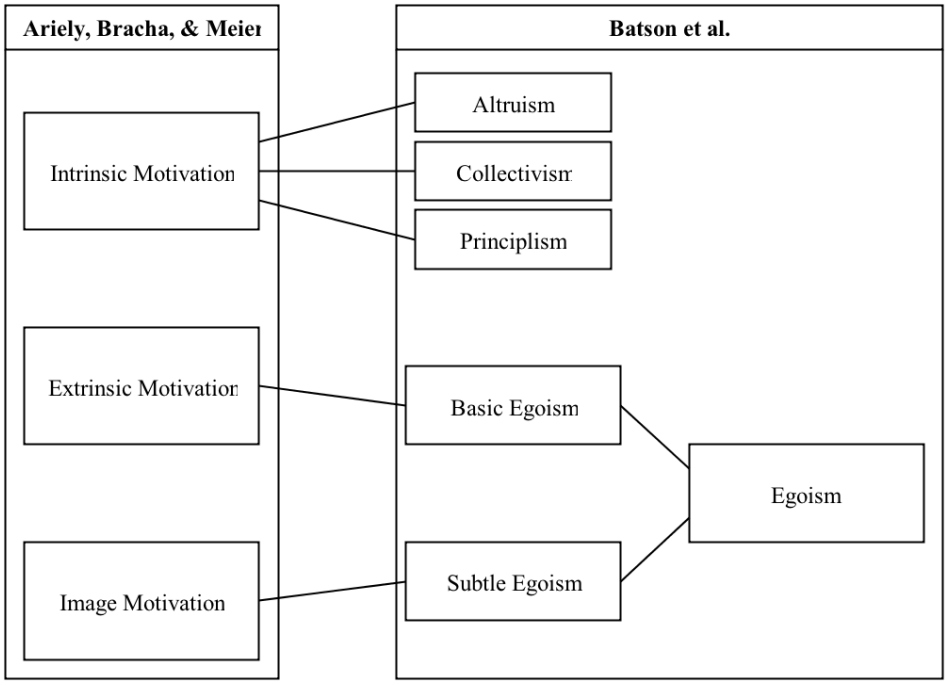


Figure A.1. Integration of the Theories of Pro-social Behavior Motivation

In order to understand how to encourage pro-social behavior through stimulating these motivations, it is crucial to understand how monetary and non-monetary rewards in general affect human motivation and propensity to act. The following section will therefore describe the theories and frameworks that exist in the area of motivation science regarding the effects of and interactions between incentives and punishments.

A.2 The Role of Monetary and Non-Monetary Incentives in Stimulating Motivations for Pro-Social Behavior

Reeve (2009) defines incentives as environmental events that attract or repel a person toward or away from initiating a particular course of action. Incentives thus incorporate all types of rewards and punishments in existence. The system of effects associated with these incentives is an intricate one, with differing effects of the specific incentive characteristics on the different types of motivation. In addition, there are effects of one type of motivation affecting another.

The Hidden Costs of Reward

The first basic effect originates in the psychology of human motivation and has had many different names throughout history, such as "the hidden cost of reward", the "over-justification effect", and the "corruption effect" (Frey & Jegen, 2001). The hidden costs of rewards form one of the most well-established findings in psychology. It shows that besides the possible intended primary effect of promoting behavioral engagement in a desired activity, external rewards may have several unintended and possibly adverse side effects. Reeve (2009) notes three such side effects, in particular. The first is that rewards can undermine intrinsic motivation; the second is that rewards interfere with the quality and process of learning; and the third is that rewards interfere with the capacity for autonomous self-regulation. Each of these effects has a direction opposite to the primary goal of incentivizing certain behavior. The most prominent and relevant side effect is the first one: (external) rewards undermine intrinsic motivation. In an early study, Lepper & Greene (1975), for example, showed in an experimental setting that children showed less intrinsic motivation for a certain action after doing this action for a reward: their intrinsic motivation for doing the activity, in this case solving puzzles, was undermined.

Using a similar type of experimental research setting as Lepper & Greene (1975), Reeve (2009) was able identify and disentangle two limiting conditions under which rewards will exhibit the three types of unintended side effects. A reward has to be (a) tangible and (b) expected. If a reward is expected or if the actor knows beforehand that he or she gets a reward after doing a certain action, intrinsic motivation is more quickly undermined than when a reward is unexpected. This means that in order to externally regulate behavior through rewards without undermining the intrinsic motivation for that behavior, it is essential that the reward is unexpected. A problem here, of course, is repeated behavior: the second time, a reward is already expected. Even if the reward is not mentioned explicitly, the actor might still to a certain extent expect a possibility of a reward. If a reward is tangible, such as money, food, or a trophy, the intrinsic motivation is also undermined more strongly than with intangible rewards, such as smiles or compliments. This means that when designing rewards, it is always important to think of ways to either make the rewards (more) intangible or to frame a reward in an intangible way, such as giving a day off instead of paying a day's worth of money (Lacetera & Macis, 2008).

In addition to the expectancy and tangibility factors, Deci, Koestner, and Ryan (1999) identified a third factor that influenced the strength of the intrinsic motivation-undermining effect: contingency. In their meta-analysis of 128 prior studies, they showed that different types of contingencies have different effects: when a reward was task-non-contingent, no effect was shown, even when the rewards were tangible and expected. When a reward was engagement-contingent, completion-contingent, or performance-contingent, the effect of the reward on subsequent free-choice behavior (such as, e.g., puzzle solving) was significant and negative.

These factors are, of course, of most concern when it comes to tasks that have high intrinsic appeal. Tasks with inherently low intrinsic appeal are much more suited to be guided by extrinsic rewards of any kind. Reeve (2009) argues that this fact applies especially to the context of several types of pro-social and sustainable behavior, citing examples such as preventing drunk driving, participating in recycling, and energy conservation. In addition, Reeve (2009) argues that in these examples, the argument can be made that the society's concerns for promoting the socially desirable behavior outweighs the concerns for preserving or protecting an individual's autonomy, intrinsic motivation, quality of learning, and autonomous self-regulation. Table A.2 summarizes the sketched arguments

Reward Factor	*Undermines intrinsic motivation when:*	*Review authors*
Tangibility	Rewards for the task are tangible, such as money, food, or prizes	Reeve (2009)
Expectancy	Rewards are expected by the actor before performing the task	Reeve (2009)
Contingency	Rewards are contingent on performance, engagement, or task-completion	Deci, Koestner, & Ryan (1999)

Table A.2. Reward factors and effect on intrinsic motivation

Internalization

Another (side) effect that incentives can best be understood when interpreted as part of a conceptual framework referred to as 'Self-Determination Theory' (Ryan & Deci, 2000). Ryan and Deci (2000) interpret motivation and the regulation of behavior not as a categorical variable, but rather as a continuum, with on the one hand external regulation, and on the other hand internal regulation. This relationship is displayed in Figure A.2 below.

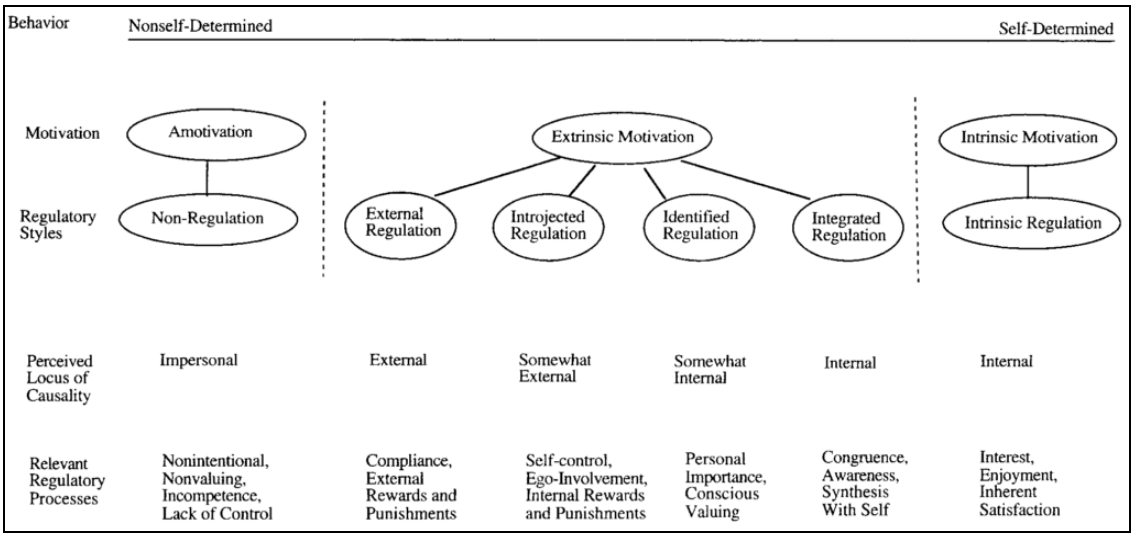


Figure A.2. 'Self-Determination Theory' (Ryan & Deci, 2000)

Ryan and Deci (2012) argue that different types of extrinsic motivation exist: first, there is externally regulated motivation; For example, monetary incentives in themselves encourage an external regulation type. Second, introjected regulation is more self-determined, meaning that the regulation and motivation comes more from within the actor, even though it is still extrinsic motivation in the sense that it is triggered by an external event. It is also a social motivation: you feel good when you do something that others see as doing well (pride, self-esteem) and you feel bad when you do something that others see as bad (guilt, shame). Third, identified regulation is a voluntary acceptance of behavior as instrumental for a goal: you do something because you feel that it brings you good in your relationship with others. Fourth, integrated regulation is when someone does something because it is in line with his or her values (Ryan & Deci, 2000). This explanation can be associated with some subtle forms of Batson's (1994) egoism (see Table A.1) or even principlism. The movement from external regulation towards integrated regulation of behavior (see Figure A2) is called internalization. The level of internalization of an activity is thus determined by the level of agreement with the reasons for performing that activity.

Reeve (2009) explicitly relates this theory of self-determination to pro-social behavior. He argues that it is important to make the sensible reasons behind certain behavior clear and explicit in order to motivate a person, as this will enhance the level of internalization and self-determination this person will hold for this behavior. In other words: a person will regulate his or her behavior more internally when he or she knows the reasons and agrees with them. Thus it is crucially important to clearly and explicitly communicate these reasons. In the context of sustainable decision-making in the energy domain, for example, this would imply that it is important to educate people about what happens when people make non-sustainable decisions and why, then, it is important to conserve energy.

Cognitive Evaluation Theory (CET) constitutes an extension of self-determination theory and is based on two fundamental needs: the need for competence and the need for autonomy. These needs are argued to be inherent in every human and to influence the amount of motivation a person has for a certain activity. These needs are almost always affected by incentives from an external source, and therefore incentives have an indirect effect on motivation through cognitive evaluation. According to Reeve (2009), each reward, therefore, has a controlling aspect and an informational aspect. The controlling aspect has a negative influence on the need for autonomy ("I feel that what I do is because of the reward I get.") and the informational aspect has a more positive effect on the need for competence ("Getting a reward means that I did my job well so I can feel confident."). Almost all rewards have both of these aspects, but it is the relative salience of the controlling aspect (negative) compared to the informational aspect (positive) that determines the effect of the incentive used. These negative and positive effects work mainly through the internalization process and self-determination described above.

The salience, in this case, is adjustable, since this is a matter of perception on the agent's part. In other words: if a principal wants to incentivize an activity, he can choose to frame it either in a controlling way or in an informational way (Reeve, 2009). For example, a supervisor could offer the following, more informational and less controlling praise for an employee: "Excellent job, your productivity increased by 10%". In turn, "Excellent job, you did just as you should" would be more controlling and less informational. Hence, *f*or both competence and autonomy to be high, an external event should be presented in both a non-controlling and informational way (Reeve, 2009). It is important to note, therefore, that ultimately the motivational effect that a certain incentive exerts can stem from the way an incentive is administered rather than the content of the incentive itself.

Empirical studies offer support for these theories. Of particular relevance for pro-social behavior in the energy domain, Staats, Van Leeuwen, and Wit (2000) conducted a field experiment in which they tested the effect of information interventions and feedback on aggregate energy use in an office building. The information interventions mainly included the explanation that acting in a certain way would reduce energy consumption. As their interventions, they used (a) a brochure asking participants to save energy by performing a specific behavior, (b) weekly updated collective feedback on how many employees already performed the behavior, (c) a poster with reminding information, and (d) individual feedback on specific behavior. Two four-week intervention periods were administered and were separated by a withdrawal period of 1 year. In addition to measuring behavior prior to the interventions as a benchmark, behavior was assessed one year after the first intervention period in order to measure behavioral maintenance; and as well one year aft the second intervention. Staats et al. (2000) hypothesized that the interventions would have a positive effect on the energy saving behavior of the participants. They also examined the persistence of this saving behavior. At the end of the two-year testing period, the target behavior had led to an energy (gas) consumption reduction of approximately 6% over the two-year period. The data does show, however, that the participants needed to be reminded of the energy-saving aspect of the target behavior in order for them to display this behavior in the long term. In other words, internalization takes time. Ultimately, at the end of the project, internalization of the

behavior did occur, as evidenced by a survey showing that more people believed that the target behavior helped conserve energy.

Motivation Crowding Theory

Frey and Jegen (2001) proposed an integration of the aforementioned psychological theories into an economic model of the effects of incentives on motivation. Specifically, they outline circumstances under which presumably intrinsic motivation is either undermined or strengthened, identifying both a crowding-out effect, as well as a crowding-in effect, which, together, constitute the key ingredients of the "motivation crowding theory" (see Figure A.3 for an illustration).

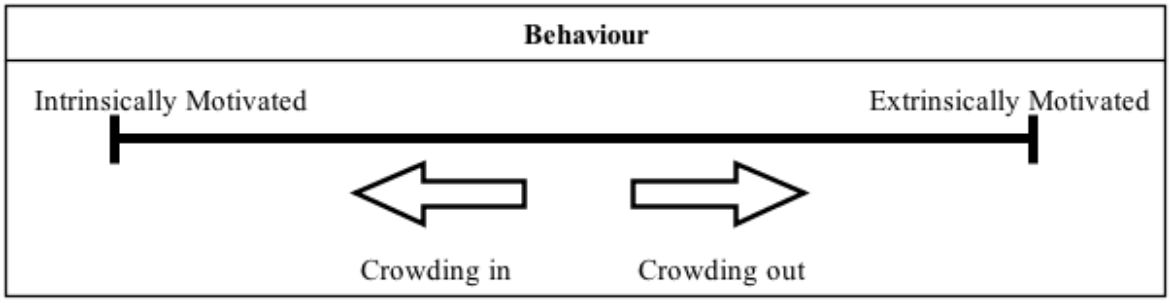


Figure A.3. Motivation crowding theory

If an incentive shifts observable behavior towards the intrinsic pole, the effect is defined as crowding-in, the opposite movement is defined as crowding-out, which is similar to the aforementioned psychological notion of the hidden cost of reward. Both of these effects are effectuated through external (incentive) interventions. Frey and Jegen (2001) assume that all incentives, first, may affect intrinsic motivation, and, second, may either have a crowding-out or crowding-in effect. The authors state that the mere incidence of an incentive induces the crowding-out effect, but once all intrinsic motivation has been crowded out, normal economic relative-price-thinking takes over: raising a reward will then raise performance. In total, therefore, only those people who receive a considerable amount of money work as well as people who work for free. The net total effect is ambiguous as the level of crowding out is not known for each specific situation, but the existence of it is rather undisputed. The crowding-out effect happens through the two possible psychological processes of impaired self-determination and impaired self-esteem, the latter of which can be seen as a rephrasing of the negative effect of unsatisfied competence and autonomy needs.

Preliminary Summary: Effects of Incentives on Motivation

In conclusion, incentives can have several effects on motivation. The most important negative effect is that of the hidden cost of rewards which implies that intrinsic motivation is undermined when an external incentive is present. This negative effect is most likely to prevail when an incentive is tangible, expected, and contingent on performance, completion, or engagement. Incentives can also have an effect on the level of internalization of behavior. One of the most important modulators of this effect is

information intervention, which explains the reasons behind a desired action. Internalization leads to more intrinsic regulation, which in turn leads to self-determination. The more self-determined an action is, the more an action is performed, and the higher the level of autonomy. In addition to this, CET indicates that incentives can have either a positive or negative effect on regulation type through the relative saliency of the informational and the controlling aspect. The more informational and non-controlling the manner in which an incentive is presented, the more the needs for autonomy and competence will be supported. This leads to a more internal regulation type and better performance on the incentivized task. In other words, when applying this theory to real-life situations, it is important that an incentive has the following features, depending on the characteristics of the behavior to be incentivized:

1. It is intangible.
2. It is not a reward (if it is, then it should be presented in an unexpected and task-non-contingent way).
3. It is presented in a non-controlling way, thereby supporting autonomy and competence.
4. It is presented in an informational way, thereby supporting autonomy and competence.
5. Information intervention accompanies the incentive.

Inter-temporale Choice and Time–inconsistent Preferences

Pro-social behavior relating to sustainable decision making in general, and to energy conservation specifically, often has an inter-temporal aspect to it. An individual's decision in the present has an effect on her or his costs and benefits in the future. When looking at the inter-temporal aspects of pro-social behavior, the fact that individuals may have time inconsistent preferences is a major problem. Consistent time preferences imply that individuals should stick to plans for future consumption, unless there is a good reason to do otherwise (Strotz, 1955). However, we know from a broad set of studies (Buchel & Peters, 2011), that most humans as well as animals display some degree of time inconsistency.[44]

Time inconsistency can be incorporated into discounting. An individual's discount rate measures his or her disutility from delaying consumption from sooner to later periods. When people delay outcomes, they tend to have present-biased preferences (Shefrin & Thaler, 1981), i.e. they behave as if the discount rate has become higher for shorter than for longer periods. By using a hyperbolic discount function instead of an exponential one, we can incorporate these biased preferences into discounting. By assuming a hyperbolic

[44] There are two different kinds of time inconsistency, cross-sectional time inconsistency and longitudinal time inconsistency. Cross-sectional time inconsistency means that when people are offered a smaller-sooner reward and a larger later reward, the larger-later reward will be preferred after only a small increase in delay of both options (Herrnstein & Kirby, 1995). Longitudinal time inconsistency, also called impulsivity, means that when a reward becomes closer in time a smaller-sooner reward will be preferred over a larger later one (Read, 2004).

discount functions one can explain why individual's preferences can change from a larger-later to a smaller-sooner reward (Read, 2004).

Inter-temporal choice is characterized by several anomalies, which are all summarised as time-inconsistency. First, there is the *delay effect* that shows that when an outcome is delayed people tend to add a higher discount rate to shorter than to longer periods. Furthermore, there is the *interval effect*, which means that when the interval between two outcomes is large, higher discount rates are used for the shorter outcome. The *magnitude effect* indicating that the discount rate will be higher for smaller amounts. Additionally, there is the *discretion effect*, indicating that people add higher discount rates when increasing an outcome than from expediting the same outcome (Loewenstein, 1988). Likewise, there is the *sign effect* that explains that the discount rate is lower for losses than gains, showing that people tend to be loss-averse. At last there is the *sequence effect*, which shows that even though the outcome is the same, people generally prefer constant or increasing sequences over decreasing ones (Read, 2004).

There are several proposed mechanisms and theoretical models to explain the anomalies in inter-temporal choice, as e.g. the value function approach (Loewenstein and Prelec (1992)), the attribute-comparison models (Read (2004)), the cognitive/representation models (Becker & Mulligan, 1997), temporal construal theory (Trope & Liberman, 2000, 2003). So far the proposed theories and models are unable to provide explanations for all described anomalies simultaneously and more research is needed to develop a conclusive explanation.

Another major problem that arises within inter-temporal decisions is the presence of the *commitment problem*. People need to commit to do something at this present point in time, while they do not receive any benefits or see any results yet. The outcomes of the decisions made today will only be visible in the future and future utility is valued less than current utility (Brocas, Carillo & Dewatripoint, 2004). As a result, people may not be able or willing to stick with their initial commitment. The commitment problem can arise for two different types of goods: investment goods and leisure goods. Investment goods are goods which require immediate costs and delayed benefits. Leisure goods have immediate benefits and delayed costs. We can also distinguish two types of agents, sophisticated agents and naïve agents. Sophisticated agents are aware of their time inconsistency and naïve agents are naïve about it (DellaVigna & Malmendier, 2004). In general agents are almost always (partially) naïve.

To overcome the commitment problem, incentives can be used to help people stick to their commitment. For example, New York Mayor Michael Bloomberg introduced a new policy in 2006 involving monetary incentives to increase commitment. He provided poor families conditional with cash transfers to incentivize them to make the 'right' decisions concerning doctor's appointments and other basic tasks that cost money, but are positive in the long-term (Charness & Gneezy, 2009). In 2009, Charness and Gneezy (2009) devised a laboratory test to find out whether it is possible to improve people's decision making in this way. Specifically, they investigated whether the development of good habits can be encouraged by the financial incentive of paying people to attend a gym a

specified number of times per month. They did this in a field study by investigating three different groups of students and comparing their behavior. All groups received handouts with the benefits of exercise, one group did not receive anything else, people in the second and third group both received $25 to attend the gym one time per week and in one of these groups students were paid an extra $100 if they went to the gym eight more times in the four weeks after that. The results showed that the high incentive group had a higher and long-lasting post-intervention attendance compared to the other groups, suggesting that good habits, once developed in response to initial financial incentives, might become persistent. However, given the time frame of the study, no real conclusions regarding long-term effects could be drawn.

A.3 The Manager as an Individual who has Decision Making Authority

In the scope of this study the manager is seen as an individual who has decision making authority which arises from his position in the organizational hierarchy. Among the activities in which managers are involved are: acting as a representative of a work unit, disseminating information necessary for the functioning of work units, networking, negotiation, planning and scheduling work, allocating resources which may include people, money, materials and equipment, directing and monitoring the work of subordinates, problem solving and handling disturbances to work flow (Hales, 1999). Responding to the institutional pressure (DiMaggio and Powell, 1983), which will be clarified in the next section, managers will undertake different actions when dealing with contingencies. Oliver (1991) identifies different ways in which organization might respond to the outside influence. He suggests that management choice can shape the direction in which organization develops and this depends on the nature and context of the pressures. Therefore, it would be useful to recognize the managerial power in moving the organization towards the desired outcome. According to Hall et al. (2004) in order for the organization to perform its functions, some members should have more power than other so that organizational goals are met. Before identifying the effects of this power on the decisions that managers make, we will start our analysis with a proper definition of power. The simplest one is provided by Salancik and Pfeffer (1977) and denotes power as the ability to get things done in the way one wants them to be done. Even earlier, Emerson (1963) describes power as a relational property that gives one actor the possibility to control the behavior of another one by manipulating rewards important to the other. In the organizational setting, this translates into the manager's ability to produce strategic change by utilization of organizational resources and thus affect the outcomes for actors who have vested interests in the firm (Pfeffer & Salancik, 1978). The former characteristic of managerial power relates to the definition of formal power, which arises from a position in a hierarchy and the decision-making authority that one has been given. On the other hand, informal power results from personal, relational and situational characteristics (Blau, 1964). Among other sources of informal power are possession of information which is important for others, expertise resulting from long

tenure, and history of past accomplishments (Greve & Mitsuhashi, 2007). Informal power emanates from social capital and differs among individuals to the extent to which others feel an obligation to reciprocate a favorable action.

In the organizational setting, Finkelstein (1992) distinguishes between four types of power: structural power, ownership power, expert power, and prestige power. Structural power is related to the definition of formal power and results from the position in the hierarchy and the authority that stems from that position. Ownership power identifies the strength of the position of the manager in the principal-agent relationship. Managers who have the ability to respond in adequate manner to environmental contingencies that leads to organization's survival have expert power. Finally, prestige power is achieved from the reputation in the institutional framework and among stakeholders. The different types of power that managers can possess can affect their orientation towards achievement of their goals. According to Guinote (2007), high-power individuals, such as managers, regulate in a better way their actions towards accomplishment of their objectives. Facing fewer constraints and greater freedom (Galinksy, Gruenfeld, Whitson, & Liljenquist, 2008), high-power individuals can focus on the tasks they have to complete and are not disturbed by other individuals' actions (Bunderson & Reagans, 2011). As a result, they are more confident and this increases their ability to update relevant information, initiative- and risk-taking. Even if they have the power to make decisions and act on behalf of the stakeholders, managers need to justify their decisions and the investments they choose to stakeholders. Providing accounts (or explanations) for the decisions is a part of the manager's position. These help them to remove themselves from situations which could have negative effects on their image or claims for legitimacy (Ashforth &Gibbs, 1990). Through excuses and justifications (which are types of accounts) managers are kept responsible for their actions and social order is maintained (Hall et al., 2004).

Stewardship Theory

The intrinsic need of managers to act responsibly and in the interest of stakeholders is incorporated in the stewardship theory developed by Davis, Schoorman, and Donaldson (1997) to suggest that managers possess intrinsic characteristics such as collectivism, trustworthiness and pro-organizational behavior. Other features of stewards include other-regarding perspective, long-term orientation, affective commitment building, self-efficacy and self-determination (Hernandez, 2012). Furthermore, stewards identify themselves strongly with the organization and thus possess higher power in their relationships with individuals below and above them in the hierarchy. Another distinctive quality of stewards is their high self-efficacy and motivation by higher order needs. The orientation of the manager toward the collective good and the advancement of social interests is related to what McClelland (1975) terms socialized power orientation. It can serve as a good example of the stewardship theory because individuals with such power orientation take into account collective interests and power is used in a more cooperative way.

As it was proposed earlier, powerful individuals are more likely to take risks and are less loss averse (Inesi, 2010) than those who have lower power. Another dimension of managerial risk taking relates to framing of the outcomes and the way in which they are presented to decision making individuals. According to March and Shapira (1987) managers are more prone to risk taking when questions are framed in a business context than when they are framed in a personal context. The important effect of framing is also recognized by DeMarree, Briñol, and Petty (2012), who suggest that if thoughts are framed in pro-social terms, then powerful individuals will make more pro-social judgments and behave more pro-socially than individuals with lower power. This finding is also supported by Piff et al. (2011). In their experiments, they start from the fact that powerful people are more focused on current goals and internal motives than those with lower power (Guinote, 2007). After priming individuals with power, Piff et al. (2011) show that these individuals behave in a pro-social way when pro-social tendencies are salient. The fact that an individual with high-power is more likely to pay close attention to information about others and act pro-socially than the one with low power has also been established (Overbeck & Park, 2006). In all these studies, the main idea is that power can lead to pro-social behavior and consideration of the interests of other people when such pro-social tendencies are present. If, on the other hand, such tendencies are not noticeable, then powerful individuals will exhibit self-serving behavior. In such occasions, powerful individuals will be less accurate in assessing the interest and situation of others and are more likely to act in a self-serving way (Galinsky, Magee, Inesi, & Gruenfeld, 2006).

Another study (Chen et al., 2001) which used priming individuals with power to compare their responsibility towards community goals concluded that those high-power communals show social responsibility and adhere to the values of the society. Another explanation is proposed by Jacobs et al. (2003), who suggests that right and wrong considerations of people placed in a position of power may allow them to focus on the moral implications of their behavior rather than on self-interest.

Institutional and Stakeholder Influence

While the manager can make choices regarding investments due to the power granted to him by the owners of the company, he is also constrained to some extent by the institutional environment and the stakeholders (the broad society) who can keep him responsible for his actions. Each organization operates within an institutional framework. The institutional environment consist of many actors which may have conflicting interests and exert influence on the organization, and comprises key supplies, resource and product consumers, regulatory agencies and other organizations that produce similar products or services (DiMaggio & Powell, 1983). The primary concern of this framework is the organization's relationship or fit with the institutional environment, the effect of social expectation on the organization and the inclusion of these expectations in the organization's characteristics (Dacin, 1997). Hawley (1950) was the first one to suggest that variation in organizational forms result from diversity of the environment. This is the isomorphism principle that DiMaggio and Powell (1983) use to propose that organizations will resemble the environment within which they operate and each other

over time. A proper definition of isomorphism is provided by the Merriam-Webster dictionary, which describes isomorphism as ―being of identical or similar form or shape or structure‖. In their study DiMaggio and Powell (1983) identify three mechanisms that drive institutional isomorphic change: coercive, mimetic and normative. Coercive isomorphism results from formal and informal pressures which could be political influence and organizational legitimacy. While political influence includes laws, regulations, and accreditation processes, legitimacy represents the extent to which the organization's actions are deemed desirable, proper and adequate within the socially constructed system of norms, values and beliefs (Suchman, 1995). Mimetic isomorphism is present when firms mimic or copy each other's behavior if they consider the actions of the competitors to be more legitimate or more successful when there is uncertainty in the organizational environment. Normative pressure can also lead to resemblance of organizations to each other and over time. It represents professional norms and values that have influence on organizational behavior.

In the institutional environment an important role is also played by the stakeholders of the company. Different organizational theories place different importance on the extent to which stakeholders should be managed, but a unifying point of these theories is that the organization is related to many groups which exert influence on them. The simplest and at the same time broadest definition of a stakeholder is provided by Freeman (1984): ―any group or individual who can affect or [be] affected by the achievement of an organization's objectives‖. This definition shows that the relationship can go in both directions; it could be the case that stakeholders affect organization's decisions but it also means that outcomes of managerial decisions affect them. Pfeffer and Salancik (1978) explain the existence of stakeholders as support that the organization needs to receive from the environment. In turn, the environment imposes some constraints on the actors within the organization, such as those identified by DiMaggio and Powell (1983), which inhibits their behavior and hence creates dependence. Clarkson (1995) distinguishes voluntary from involuntary (direct from indirect, Rowley, 1997) stakeholders, putting emphasis on the fact that voluntary stakeholders are any individuals that have invested in the firm and are placed at risk as a result of firm's actions. Involuntary stakeholders, on the other hand, have not invested in the company, but still bear some risk. The notion of risk indicates that stakeholders are those parties that have legitimate claims. Identifying stakeholders includes recognition of two attributes: a claim and the ability to influence the firm (Savage, Nix, Whitehead, & Blair, 1991).

A model developed by Donaldson and Preston (1995) recognizes that stakeholders in the firm can be the government, investors, political groups, customers, suppliers, communities, employees and trade associations. In turn, there is a constant interplay between the firm and each of these actors, which is shown in Figure A.4.

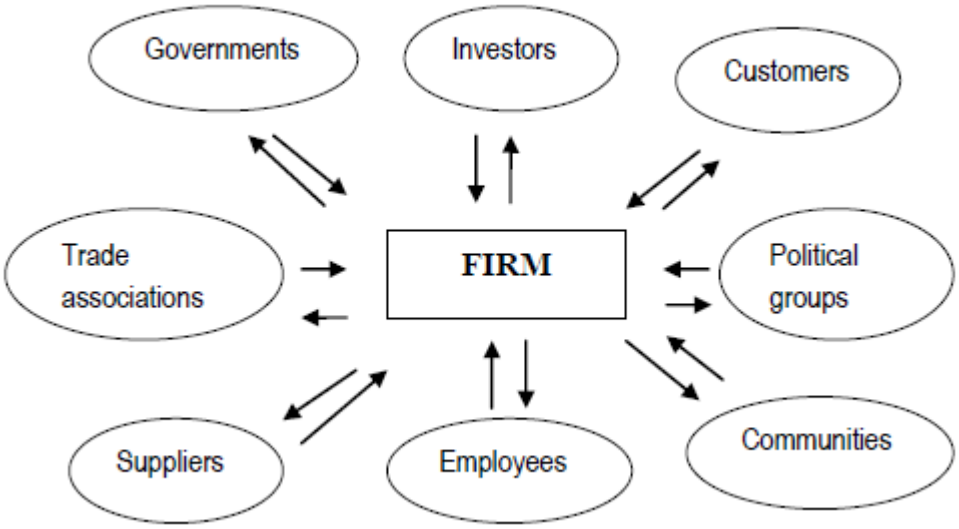


Figure A.4. The stakeholder model. Adapted from ―The stakeholder theory of the corporation: Concepts, evidence, and implications, by T. Donaldson and L.E. Preston, 1995, *Academy of Management Review*, 65-91.

Clarkson (1995) identifies stakeholders as the most salient group of people that observes managers' actions due to the fact that they have direct control on organizational performance and survival. In their analysis of stakeholder salience, Mitchell, Agle, and Wood (1997) recognize that stakeholders' power is present when managers perceive them to be able to impose their will on the organization. In addition to power, other stakeholder attributes include legitimacy and urgency (Mitchell et al., 1997). Similar to the definition of legitimacy suggested earlier, stakeholders can be said to have legitimacy when managers assess their actions as proper and adequate, relative to standards prevalent in the institutional framework. The idea of urgency depends on the degree of immediacy of stakeholder claims. As a result, Scott and Lane (2000) propose that the extent to which managers perceive stakeholders' needs, values and beliefs in creating the organizational image is contingent on the power, legitimacy, and urgency of stakeholders' claims. The problem with satisfying stakeholders' interest is exacerbated from the current business environment in which challenges such as climate change, environmental sustainability and corporate social sustainability are present. This creates additional pressures on managers and addressing multiple stakeholders' interests becomes of even greater significance.

Given the complexity of stakeholders' attributes, managers can use the Mendelow framework (as cited by Johnson and Scholes, 1989), in which stakeholder influence is presented in a 2 by 2 grid depending on the power and interest in the firm that these groups have, to assess the importance of each stakeholder and choose the appropriate action. While power represents the ability to influence firm's goals, interest represents the willingness to do so. For the purpose of our analysis, which is to identify the extent to which stakeholders influence firm's decisions, it is useful to make a distinction between

high- and low-power and high- and low-interest of stakeholders. The grid is presented in Figure A.5.

Figure A.5. Stakeholder mapping, the power/interest matrix. Adapted from —*Exploring corporate strategy*, by G. Johnson and K. Scholes. 1989, London: Prentice Hall.

The stakeholders with low interest and low power are those who cannot exert influence on the organization and therefore they should receive minimal attention from the managers. The next group is those stakeholders who have high interest but lack power and therefore management should convince them of their strategic decisions. If it fails to do so, they may try to gain power and join another party from the grid. Managers could satisfy those with high power and low interest by assuring them of the outcomes of the strategy. The most influential stakeholders are those with high interest and high power. Since they have both the ability and willingness to affect management plans, managers should communicate their intentions to them and discuss the implementation of their plans. As a result of this analysis that managers make, namely identifying to which part of the matrix the stakeholders in question belong, they can plan ahead how to deal with the stakeholders and satisfy their claims.

Pro-Social Behaviour by Firms: Corporate Social Responsibility

Discussions of the responsibilities of corporations and their roles in society have been motivated by the growing awareness of unfair or discriminatory business behaviour and an increasing number of social and environmental scandals (Epstein, 1987; Matthews, 1985). Nowadays, companies are expected to become socially committed even in areas not directly related to their business (Harman, 1997). Relevant to know is what the mechanisms are, how corporations become more socially committed, and how society can use these mechanisms to induce this wanted pro-social behaviour by firms. Since the

firm behaviour is determined largely by the managers of the firm, considering the motivations of managers to change behaviour might shine some light on possible incentives that can be used to 'manipulate' the managers to change firm behaviour. The vast literature about the phenomenon 'Corporate Social Responsibility' gives a clear picture what the possibilities are for pro-social behaviour by corporations. Therefore, a more thorough look into the concept of Corporate Social Responsibility (CSR) and its position within the firm and society is given in the first part of this study.

Following McWilliams et al. (2006), the definition of CSR in firm perspective is when the firm goes beyond compliance and engages in 'actions that appear to further some social good, beyond the interests of the firm and that which is required by law'. However, this is just one interpretation of CSR. The European Commission defines CSR as 'a concept whereby companies integrate social and environmental concerns in their business operations and in their interactions with their stakeholders on a voluntary basis'. Numerous other definitions of CSR have been proposed and often no clear definition is given, making it difficult to give one cohesive definition of CSR. Anything from environmental management, health and safety rules and human rights to community capacity building and philanthropic activities has been considered under the CSR umbrella (Newell & Frynas, 2007). CSR activities have been posited to include incorporating social characteristics or features into products and manufacturing processes (e.g. aerosol products with no fluorocarbons or using environmentally-friendly technologies) (Williamson et al., 2006), adopting progressive human resource management practices (e.g. promoting employee empowerment) (Sharma et al., 2011), and achieving higher levels of environmental performance through recycling and pollution abatement (e.g. adopting an aggressive stance towards reducing emissions)(Sarkar, 2008). Indeed, CSR Europe, a membership organisation of large companies across Europe, in its reporting guidelines looks at workplace (employees), marketplace (customers, suppliers), environment, community, ethics; and human rights (Moir, 2001).

What the CSR definitions and activities show is that the corporation and society are intertwined. According to the societal approach, companies are responsible to society as a whole, of which they are an integral part. They operate by public consent (the license to operate) in order to 'serve constructively the needs of society, to the satisfaction of society (Van Marrewijk, 2003). Therefore it is important to companies what the factors are that matter the most to their customers and other members of the society. Traditionally, the most important factors for customer when forming an opinion of a company were product quality, value for money, and financial performance. Now, across a world-wide sample of the public, the most commonly mentioned factors relate to treatments of employees, community involvement, ethical issues and environmental issues (Dawkins & Lewis, 2003). Following Dawkins and Lewis (2003), 69% of the British public agrees that industry does not pay enough attention to its responsibilities. In the post-Enron business world, no company needs to be reminded of the vulnerability of corporate reputation and therefore the company itself. Also on the environmental part of CSR the society demands certain standards and punishes the firms that cannot live up to these standards. Since the leak in the oil pipe of BP in the Mexican Golf and the

corresponding environmental disaster, the share price of BP dropped by 55% in the months after the disaster.

So it is not sufficient to manage corporations to optimize production variables, such as profits, productivity, jobs, and growth. Corporations must manage risk variables, such as product harm, pollution, waste, resources, technological hazards, and worker and public safety (Shrivastava, 1995). People in communities all over the world have been experiencing these negative externalities in the form of visible negative influences on their quality of life. These risk variables are the negative externalities of production. Externalities occur when 'costs and benefits are imposed on others yet are not paid for by those who impose them or receive them' (Samuelson & Nordhaus, 1992). When firms, for example, invest in energy-saving technologies in context of a CSR-policy, the externality for the society are a reduction of pollution by carbon-dioxide emission. By taking into account that the firm was the cause of the pollution in the first place, the reduction of pollution by the investment in energy-saving technologies only reduces the negative externality 'pollution' for the society instead of creating a positive one. One other example of CSR is when a firm increases the facilities for day-care in order to attract more female employees. By doing so, the women that are working at the company may affect other women to start working again. So it seems that CSR not only affects the company and its direct stakeholders but also society as a whole. Also society, now more aware of the existence of (aspects of) CSR seems to demand more CSR activities from the firms.

Principal-Agent Theory

The principal-agent setting can be briefly described as follows. The principal concludes a contract with an agent who is providing the principal with certain services. The problem is that the principal cannot achieve to be fully informed about the agent's behaviour. In order to overcome this lack of knowledge, the principal can at least try to improve his/her state of information or can try to moderate the consequences of not being informed. This latter strategy will result in offering the agent suitable an incentive to do what is asked of him/her (Schneeweiss, 2003). Conflicting objectives and asymmetric information are the two basic assumptions of the principal-agent theory. The conflicting objectives arise when the principals have different objectives than the agents. Asymmetric information means that one party has more or better information than the other party. One theory that deals with the difficulties that arise from conflicting objectives and asymmetric information is the principal-agent theory. Common examples of this relationship include managers (agent) and shareholders (principal), or politicians (agent) and voters (principal). Or consider a dentist (agent) and his patient (principal). As a patient you expect the dentist to do his job properly without giving you unnecessary expensive treatments with the only benefit of generating extra income for the dentist.

Within a firm setting, realizing that owners of a firm may have different objectives than the managers of a firm, the aligning of the different objectives seems problematic (Laffont & Martimort, 2001). The objective of the principal in the firm setting is that the agent should maximise the profits of the principal. Every allocation of funds to non-profit

maximising investments by the agent should be avoided (Friedman, 2007). In the literature there is an on-going discussion if investing in CSR is desirable because it comes with benefits (Reinhardt et al, 2008; Friedman, 2009) or if investing in CSR is allocating money to non-profit maximising investments and should be avoided (Friedman, 1962; Carson, 1993). (Note the fact that Friedman changed his mind about this topic. In his book *Capitalism and Freedom* (2009) he explains what made him change his mind). In the next two sections the arguments for these two views are given.

For the principals to push the agents into investing in CSR, sufficient arguments are needed to support the line of reasoning that investments in CSR can lead to increase in profits. Reinhardt et al. (2008) developed a list of economically suitable circumstances under which a firm can invest in CSR and even increase profits. The first option is that the action is not costly for the firm. For example, no objects are allowed to be placed on the central heating when it is turned on. This increases the efficient circulation of the warm air and the heater can be turned down a little. In a large office space this can save energy considerably. The second condition is that the socially beneficial actions may reduce a firm's business expenses by an amount greater than the cost of the actions themselves. For example, installation of energy-saving (climate friendly) technologies may generate long-term cost savings that outweigh upfront costs. Third, some firms may use over-compliance to spur future regulation, which would provide a competitive advantage over less adaptable firms. Porter and Kramer (2006) add to this argument that if a firm incorporates CSR into the business model of the firm by using the same framework that guide their core business choices, the firm would discover that CSR can be much more than a cost, a constraint, or a charitable deed but that it can be a source of opportunity, innovation, and competitive advantage. Having CSR as an integrated part of the business strategy, it can be used to successfully establish a strong international name for the company as is the case with car-manufacturer BMW. When comparing BMW (which has the best overall reputation in the world in 2012) with Toyota, BMW has 9% more willingness from consumers to buy products, 13% more recommendation from consumers, and 8% higher willingness to welcome the company in the local community[45]. The fourth argument is that in some cases socially and environmental beneficial actions may yield an increase in revenues. It is easy to think of goods and services that are differentiated along environmental lines, such as clothing made of organic cotton, or wood from forests managed in accordance with some principles of sustainability. Socially beneficial actions could also generate goodwill, improving a firm's reputation and sales. One last important argument for firms to engage in CSR is that firms may be better at solving an issue it caused itself than society can. What if the firm causes a social problem that cannot be reversed (such as energy consumption, carbon-dioxide emission, etc.)? It may well be efficient for society to let the firm solve these problems even if it comes at a cost for the shareholders (Davis, 1973). This is because firms could distribute the profits as dividends and the shareholders could then distribute the revenues to social causes (Friedman, 2007). When the firm can solve the issue it created in a more efficient way

[45] See for more information http://www.forbes.com/sites/jacquelynsmith/2012/12/10/the-companies-with-the-best-csr-reputations/3/

than the shareholders, it will cost less money than if the shareholders were solving the issue. By distributing the difference as a dividend, the shareholder will benefit more than if he had to solve the problem himself. Also, when applying the principal-agent framework on a firm's decision to invest in CSR, the agent can opt to invest in CSR because his/her personal opinion is that CSR is worthwhile investing in, or it can give the agent personal satisfaction or the agent gains respect from other parties (Bondy, 2008).

Limits for CSR within the Principal-Agent Theory

The arguments above show that CSR can improve their position relative to their competitors and even increases profits. So why do so little firms pursue an active CSR strategy? When applying the same principal-agent framework as above, some arguments can be found against investing in CSR.

Managers, in particular, are not equipped to identify appropriate objects for CSR, quite apart from the definitional laxity. They are trained in the art of business, not social welfare. They do not possess the specialist skills necessary to identify social purposes nor do they possess the allocation skills required to effectively apply the company's resources (Davis, 1973). Further, such a process would conflict with the corporate culture of most companies. Due to the principal-agent framework, most managers are orientated towards making money, and it goes against the grain to give it away. Also are most corporations naturally socially conservative and hence will not experiment unless they can see a clear profit from the endeavour (Devinney, 2009). So, unless there is 'hard proof' of positive financial returns when investing in CSR, these firms will not invest in CSR. Another argument is that involvement in CSR might dilute business's emphasis on economic productivity, divide the interests of its leaders, and weaken business in the marketplace, with the result that it would accomplish poorly both its economic and its social roles (Davis, 1973). So it is of great importance to recognize the potential of CSR within the firm's strategy and possibilities to avoid unpleasant surprises.
Friedman (2009) suggests that by spending money on social objectives, executives are effectively imposing a tax on shareholders (in the form of reduced dividends) and customers (in the form of higher prices) and employees (in the form of lower wages). From this point of view, the firm imposes taxes on society instead of the public officials. The power to act in the public interest however, ought to be confined to the government. Governments are accountable to the community for their actions, and are subject to establish procedures controlling the exercise of their powers. They are far better suited to the business of managing the welfare of society than are corporations (McCabe, 1992). Moreover, any acts of social responsibility that consume resources effectively deprive individual stockholders of the chance to be socially responsible themselves. In contradiction of the view that firms are better able to solve some issues than the shareholders can, Posner and Scott (1980) argue that shareholders are the appropriate ones to expend resources on charitable contributions, environmental saving funds and the like. It is their prerogative to give individually, since it is their property (Posner & Scott, 1980).

Implementation Gap

Even though firms within the principal-agent theory should invest in CSR, not all firms are eager to implement CSR in their corporate strategies. Barriers to the development of a CSR orientation include threats to stability, fear of change, the belief that a CSR orientation is inappropriate for the organization, or the belief that focusing on CSR will result in the organization losing sight of its core values (Maon et al., 2009). In one aspect of CSR, the implementation of energy-saving technologies, this implementation gap is particular visible.

One of the most pervasive anomalies in energy economics is the fact that firms do not always implement profitable investments in energy-saving technology. The potential energy savings that can be achieved cost-effectively may be substantial and therefore can be considered an important field of interest and is in line with the argument that investments in CSR/energy savings do increase profits. Due to this anomaly in investing in energy-saving technologies by firms, a large potential for gaining profits by investing in energy-saving technologies lies ahead and need more attention. According to NAS (1991) substantial reductions in US energy use can be achieved cost-effectively, resulting in a 37% decrease in energy-related carbon emissions. This is in line with the expected 10–35% range of cost-effective emission reductions, when implementing new energy-saving technologies, for non-US OECD countries (Bruce et al., 1996). Several explanations for this implementation gap have been raised in the literature. First, decision-makers within the firm may have insufficient information about profitable investments. Collecting this type of information is time- and resource-consuming (Velthuijsen, 1995), and firms may face constraints in the form of scarcity of managerial time or lack of skilled personnel (Beckenstein, 1986; De Almeida, 1998). Indeed, several case studies indicate that organisational and institutional barriers are important (De Almeida, 1998; DeCanio, 1998). Second, when deciding about future technology, firms may face constraints due to market imperfections such as capital rationing (Howarth & Sanstad, 1995). Third, energy efficiency is often just one of many criteria affecting the choice of equipment, and not necessarily one of paramount importance (Reddy, 1991). Fourth, the assumption of optimising behaviour may be false (Howarth & Sanstad, 1995). For example, decisions may be based on (very short) payback periods rather than the net present value criterion (DeCanio, 1998). Fifth, the economic agent who makes the investment may not be the same as the one who receives the gain (e.g. insulation of rented houses). Finally and closely related to the first point, transaction costs may be prohibitively high (DeCanio, 1998; Howarth & Sanstad, 1995). Uncertainty about the future has also been raised as a potential explanation of the existence of unexploited 'profitable' investment options in energy-saving technologies (Hasset, 1993). However, in his research DeCanio (1998) finds that in general, the data reinforce the view that there is a large potential for profitable energy-saving investments that is not being realized because of impediments that are internal to private and public-sector organizations. Following Bunse (2011) it is necessary to develop efficient and effective energy management in production to close the gap between theory and practice. With this, decision makers in firms may become aware of the energy performance in real-time facilitating more effective business decisions based on accurate and timely

information. One way to achieve this increase in awareness of energy savings by the managers is by the use of incentives.

Causality between CSR and Financial Performance

Since there are arguments for and against CSR-investments by firms it would interesting to see if there is empirical evidence on the relation between CSR-investments and an increase in financial performance by firms. Hundreds of published empirical studies have tested the relationship between various types of CSR and the financial performance of the firms. Some have found a negative relationship (Vance, 1975; Wright & Ferris, 1997). Some have found a mixed relationship (Cochran & Wood, 1984; Hillman & Keim, 2001). Some have found no relationship of significance (McWilliams & Siegel, 2000; Patten, 1992). Many have found a positive relationship (Orlitzky et al., 2003). Nonetheless, limitations in these myriad studies leave room for skepticism and confusion (Margolis & Walsh, 2003). This led Barnett (2007) to surmise 'that after more than thirty years of research, we cannot clearly conclude whether a one-dollar investment in social initiatives returns more or less than one dollar in benefit to the shareholder.' However this statement is correct because we cannot make this link, the possible reasons for the underlying arguments are the problem. The use of different statistical techniques gives different outcomes (Nelling & Webb, 2009), so there is no continuity in the results. Also the fact that CSR-investments have different impacts on different industries is not taken into account. Also not considered in the literature is that the different industries report their CSR activities in different ways (Sweeney & Coughlan, 2008). Most research on CSR has focused on the consequences of CSR implementation—or lack of implementation—on financial performance with little attention to comparative issues (Williams & Aguilera, 2008). The expectation is that for manufacture industries the gain of implementing CSR, especially the energy-saving part of CSR, is larger than in the service industry and therefore, it would be wise for the manufacture industries to explore the possibilities of profit-enhancing CSR-investments.

What is not taken into account in most of the literature mentioned above is whether the firms become more profitable when investing in CSR or if profitable firms do invest more in CSR than their not so much profitable competitors. However, there is consensus in the literature about the observation that it seems that profitable firms do invest more in CSR than less profitable firms (Margolis et al., 2007; Lougee & Wallace, 2008).

A.4 From Psychological and Economics Theories to the Practice of Policy-Making: The Role of Nudges

The term 'nudge' refers to an idea that was developed in recent studies in behavioral science, psychology, economics, and political theory (e.g., Thaler & Sunstein, 2008). The basic idea is that indirect and subtle (non-monetary) interventions and positive

reinforcement ('nudges') may be able to affect individuals' (and groups) motivations and induce them to change their choices and behavior at least as effectively—and possibly even more effectively—than direct instruction, legislation, or enforcement—possibly even at lower cost. Not surprisingly, the prospect of increasing either the effectiveness of policy-making in domains such as, for example, health, safety, and energy, or its efficiency or even both has, meanwhile, begun to attract increasing attention from policy-makers around the world. For example, the UK government has recently in 2010 installed a so-called Behavioural Insights Team (often referred to as the 'Nudge Unit'). This team "applies insights from academic research in behavioural economics and psychology to public policy and services. In addition to working with almost every government department, we work with local authorities, charities, NGOs, private sector partners and foreign government, developing proposals and testing them empirically across the full spectrum of government policy.[46] One of the team's previous projects concerned the striving to increase the rate of loft insulation in the UK. This rate was deemed (too) low despite the fact that it involved little risk for private households, in view of generous subsidies that would yield pay-back times of a few months (The Telegraph Online, Feb 11, 2013). The nudge unit identified "the sheer hassle of clearing an attic before you can insulate it" (The Telegraph Online, Feb 11, 2013) as a key obstacle ('friction cost') to people's taking advantage of the opportunity to insulate their lofts at virtually no cost. The director of the unit, David Halpern, explained this as "If there is 'friction cost' in the way of doing something, it'll never happen. We'll put it off. So a lot of what we do is about making life easier for people" (The Telegraph Online, Feb 11, 2013). Consequently, in a pilot trial in September 2011, insulation firms were requested to offer to clear the lofts first, and dispose of unwanted junk stored in the lofts. This extra service came at an additional cost for consumers. Nevertheless, the uptake of the insulation increased threefold. When the loft-clearing service was subsidized to cost price, there was even a fivefold increase (The Telegraph Online, Feb 11, 2013). Other projects of the team included an advisory project for the tax office, which resulted in a change of the wording on income tax letters, and, allegedly in an extra £200million being collected on time. In 2012, the nudge unit suggested that tax authorities would send out letters to non-payers of car taxes formulated in simpler English and with a banner headline suggesting "pay your tax or lose your car". In response, the number of people paying the tax doubled, and even tripled when the letter was personalized with a photo of the specific car in question depicted (The Telegraph Online, Feb 11, 2013).

[46] See https://www.gov.uk/government/organisations/behavioural-insights-team

A.5 Selected Nudges in the Current Project

A.5.1 (Inconsistent) Time Preferences and Commitment Devices

Temporal framing is the mechanism that can influence the inter-temporal decisions that people make and thus help overcome the time inconsistency problem. When two outcomes are the same, but framed differently, people tend to add different values to it. The reasoning behind this is that people look at outcomes as departures from a reference point or as gains and losses, instead of looking at the outcome as a final level of wealth (Loewenstein 1988). Malkoc and Zauberman (2006) show in experiments that there is a greater present bias, seen by a greater decline in consumers' discount rate, with time horizon when consumption is deferred compared to when it is expedited. People require a higher premium, when an outcome is delayed then when they expedite the exact same outcome (Loewenstein 1988). Using this knowledge, people can thus frame an outcome in the most optimal way to get the desired outcome.

Overall, though, research in psychology and economics indicate that humans procrastinate, that is: they put off actions today that in the long run they know would be good for them, such as exercising, eating healthfully, saving for retirement (for a concise overview, see, e.g., Allcott & Mullainathan, 2010). Since "tomorrow" is always a day in the future, procrastination may cause individuals to indefinitely delay actions or investments that yesterday they said they wanted to undertake today. Therefore, "commitment devices" are interventions that allow individuals to "lock" themselves *today* into the action that they want to take *tomorrow*. According to Abrahamse et al. (2005), a commitment is an oral or written pledge or promise to change behavior (e.g. to conserve energy), which is often linked to a specific goal, for instance, to reduce energy use by 5%. This promise can be a pledge to oneself, in which case it may activate a personal norm (viz., a moral obligation) to conserve energy. The promise can also be made public, for instance, by means of an announcement in the local newspaper. Then, social norms (viz., expectations of others) may play a role as determinants of conservation behavior (see also the sub-section below on social norms).

Most of the work by economists on commitment devices has focused individuals' savings decisions, but the phenomenon is no less relevant in the energy domain. The following situations provide some examples: Can individuals be induced to commit to reducing energy consumption or to engage in energy-saving investments and then stick to these commitments, for example, stick to a commitment to invest in solar panels or insulation of their home within a specific time period; stick to a commitment to buy compensation for CO_2 generation when booking their next flight?

In an early study, Pallak and Cummings (1976) used commitment to promote gas and electricity conservation among households. Those who had signed a public commitment (i.e. publication in a leaflet) showed a lower rate of increase in both gas and electricity consumption than those in either the private commitment or the control group. This effect was maintained over a period of 6 months following discontinuation of the intervention.

Recent research indicates, though, that groups' time preferences and time-related decisions (e.g., commitment) may differ fundamentally from individuals' time preferences and decisions. In a recent working paper, Abdellaoui, L'Haridon, and Paraschiv (2013) experimentally analyzed decisions involving delayed outcomes, first, for each of two partners individually and, second, for the couple together. This allowed them to directly compare the couple's behavior and the individual partners' behavior in choices over time. Using Fishburn and Rubinstein's (1982) discounted utility model and inferring measurements of utility and discounting at both the individual and the couple level, they showed, first, that the determinants of inter-temporal decisions, such as financial decisions, made by couples are distinct from determinants of individual such decisions. Second, more specifically, they found that while utility was found to be similar for couples and individuals, in decisions over time, couples discount future amounts of money much less than do individuals. According to Abdellaoui, L'Haridon, and Paraschiv (2013), this finding suggests that making joint decisions significantly reduces revealed impatience. Their findings are consistent with an earlier experimental study by Milch et al. (2009) who found that participants discounted more when they acted as individual decision-makers rather than in group decision context. Taken together, these findings suggest that the distinction between individuals and couples might as well translate to the household level, and that households discount future consequences less than individuals. In terms of savings this would mean that they are less impatient, while in terms of energy conservation, they might attach greater weight, compared to individuals, to the negative externalities of (excessive) present-day energy consumption.

A.5.2 Social Norms

Social comparison has been argued to influence pro-social behavior (Andreoni & Petrie, 2004). Festinger (1954) explains social comparison as a human need to evaluate their abilities. Individuals do this by choosing as a standard of comparison others who are perceived to have similar or slightly better attitudes and abilities (Goodman, 1974). Social comparison theory posits that people strive to present themselves in a way that would give them social approval (Cason & Lui, 1997). If people observe the average tendency in the society, then they would like to act in a more favorable way than the one prevalent among all individuals. As a result, individuals constantly adjust their behavior.

Various mechanisms may underlie individuals' adherence to social norms (Allcott & Mullainathan, 2010). They may conform to others' behavior because they believe in the wisdom of crowds, i.e. that others took an action because they had more or different information about its benefits. Or they may perceive that there is some external approbation or inner comfort from conformity. In a recent study, Goldstein et al. (2008), partnered with an upscale hotel in Phoenix, Arizona, to induce guests to reuse their towels. The researchers tried several different messages: "Save the Environment," "Preserve Resources for the Future," "Partner with the Hotel to Save the Environment," and "Join Your Fellow Citizens in Helping to Save the Environment." The final card, which included the information that the majority of hotel guests do reuse towels – i.e. that conservation was the social norm – yielded a significantly higher towel reuse rate (44.1%) than the environmental protection conditions (35.1%) This result illustrates an

important broader point (see also Dolan and Metcalfe, 2013): social norms in particular appear to be a very powerful nudge (see for details the subsection on effect sizes). Legacy norms and the concerns about them, the psychological cue that we are interested in this study, can be interpreted as fitting into a broadly interpreted framework of social norms that extends the group of social "peers" that evaluates an individual to future generations. While little is known to date about the effects of such legacy concerns on energy use behavior, successful marketing campaigns in the private sector have been making use of this potentially very powerful type of cue for quite some time already.

The instinct to follow social norms has also proved compelling. Tax letters, for example, were recently changed to include a headline statistic: a percentage of how many people in the local area had already paid their taxes. Repayment rates increased by 15 per cent. () (The Telegraph Online, Feb 11, 2013).

The effect of social norms on firm behaviour

Many studies are performed on individual behaviour and norm incentives, however not much is known about the firms position relative to the norm and firm behaviour. The norm within the individual is part of the learning and adjusting of behaviour in response to experiences. Within the organizational behaviour literature this learning and adjusting of behaviour is linked to aspiration levels (goals of the organization). Following March and Simon (1958), a basic assumption of many models of organizational behaviour is that individuals and organizations learn and adjust their behaviour in response to experience. The main assumption made is that organizations set goals and adjust behaviour in response to favourable and unfavourable feedback in accordance with simple decision rules (Cyert & March, 1963). The role of goals, or aspiration levels, is a critical part of these models (Lant, 1992). In the literature on managerial interpretations, aspirations determine whether past performance is framed as a success or failure, thus influencing the interpretations of the managers and result in subsequent organizational behaviour (Lant, 1992). So aspirations are a critical variable that affects future behaviour of organizations. Considerable research has shown that these aspiration levels serve to simplify the cognitive processes associated with managerial decision making (Mezias et al., 2002). For example, the setting of aspiration levels in organizations serves to direct efforts and affect strategy generation, choice, and implementation (Morecroft, 1985; Milliken & Lant, 1990).

In a field study where data were gathered from four Markstrat industries comprised of ten teams of managers in an executive education program and ten teams of MBA students enrolled in a marketing strategy course at the Stanford Graduate School of Business, Lant (1992) finds that the aspiration formation process seems to be best described as a process of adjustment in response to past aspirations and past performance. Based in the results, Lant suggests that adaptive, history dependent models are more accurate descriptors of aspiration formation than a rational model of expectation formation. This result is highlighted by the significant effect of past aspiration in conjunction with the rational expectations model, as well as the fit of the adaptive model (Lant, 1992).

The norm contains information about the opinions and performances of peers. So the norm could act as an important feedback factor for the past behaviour of the firm, relative to its competitors and adjust the aspiration level for the next period. Due to the fact that the manager is an individual in the firm, it is likely that the manager will reflect his/her position relative to managers of other firms. By doing so, reputation and self-image are important intrinsic motivators to behave pro-socially in order to measure up to the norm. In this view, the norm can act as an important 'learning factor' that changes firm behaviour. So, within the principal-agent framework, the norm-incentive can be used by the principal to induce an increase of CSR-investments.

As is argued in Section A.2, reputation and self-image are important intrinsic motivators for people to behave pro-socially. For managers reputation is an important intrinsic motivator. This is because the stronger the manager's reputation, the more powerful he is within the firm and the more influence he has in the decision making process (Finkelstein, 1992). Since investing in CSR can be viewed as a form of reputation building of a firm (McWilliams et al., 2006), the manager who made the decision to invest in CSR can thereby increase his own reputation when it becomes visible that the firm is performing better than before the CSR investment decision. This results in the manager being more powerful and influential than before. If the level of CSR investments of the firm is lower than it peers, it can cause reputation damage of the firm and its managers. Therefore it can be expected that the social norm acts as a feedback factor to adjust the aspiration levels of the firm. Also the effect of the social norm on the self-image of the manager is expected to have an influence on the pro-social behaviour of the managers. The effect of the norm incentive on the self-image of the managers is expected to be stronger than the effect on the individual. This stronger effect is expected because the manager's actions are visible to a substantial greater amount of people than the individual's actions and therefore have stronger implications on the self-image and reputation of the manager.

A.5.3 Legacy Reminders

A legacy reminder is a method of instilling an individual with the desire to leave something behind for future generations. The words themselves have been developed specifically for the experimental purposes of this study, yet the concept behind it is not novel, it relies heavily on research on the motivational properties of legacy (Wade-Benzoni & Tost, 2009; Wade-Benzoni, Tost & Hernandez, 2012). These authors state that the psychological mechanism should activate "individuals' inherent desires to generate a positive legacy [that] can transform the expected barriers to intergenerational beneficence (i.e., social and temporal distance) into conditions that promote beneficent allocations to future others" (Wade-Benzoni, Tost & Hernandez, 2012, p.3). This psychological solution relies on forming a psychological bond with future others as a response to the desire to create a legacy. People try to symbolically extend themselves into the future and in this way immortalize themselves through their legacy, a phenomenon defined in the literature as 'immortality striving' (Tost, Hernandez & Wade-Benzoni, 2008; Dickinson, 2009; Wade-Benzoni & Tost, 2009). As these authors point out, this use of legacy as a means to strive for immortality is a good way to reduce both the interpersonal and inter-temporal distance and discounting (Wade-Benzoni, Tost & Hernandez, 2012). First, the desire for a legacy brings the future closer to an individual,

given that he should particularly be mindful of those that exist after him. Second, this automatically helps him to bring the other close by, since he himself will die and other people therefore will necessarily have to be the ones to carry on his existence, albeit symbolically. It is in this way that the concern for legacy creation reconciles individual interest with collective interest: the beneficence towards the future other (the collective interest) is essential to leaving a positive legacy (individual interest). Legacy reminders are therefore particularly useful in any attempt to solve an intergenerational social dilemma. This section, however only provided a short description of the concept, and leaves questions on the meaning of legacy, and the way of creating the desire for a legacy. Hence, a more thorough explanation of the mechanism in the next part will attempt to shed light on these issues.

The workings of the legacy reminder

In order to understand how a legacy reminder works, it is imperative to gain a deeper insight in the "inherent desire" of a person to leave a legacy. This part will therefore elucidate on the motivational characteristics of legacy.

Wade-Benzoni and Tost define legacy as "an enduring meaning attached to one's identity" (2009, p.183). It serves, according to the researchers, to pass on the meaning of an individual's life to the future. This personal life meaning can be perceived as the culmination of all kinds of relationships, or set of relationships, that are perceived as exemplary for a person's life. In particular, two types of relationships are distinguished: firstly, relationships between a person's existence and the existence (real or symbolic) of another individual, and secondly the relationship between one's existence and that person's cultural worldview, his values or value systems (Wade-Benzoni & Tost, 2009). In line with Bakan's theory (1966, as cited in Wade-Benzoni & Tost, 2009), the researchers connect these two types of relationships that establish someone's personal life meaning with two fundamental needs in life: argentic and communal needs. These are, respectively, the need to exist as an individual, as shown by self-assertion, self-expansion, and self-protection, and the need to be part of a large group or collective. People then achieve a meaningful life in two ways. In the first place, they serve their argentic needs by adopting certain values and views and exhibit behavior that is thought to fit these as best as possible. For example, a person who values tidiness will make sure to clean his house frequently. In this case, achievement is the scoreboard that links someone's identity with his values. In the second place, people satisfy their communal needs by attempting to create relationships with other people through affiliation. For instance, an individual joins the local soccer club to become part of a larger overlapping identity.

In sum, passing on a legacy means passing on personal life meaning. An attempt to transfer this meaning to future generations means that one wants to teach others about the two types of things his life stood for: 1) different kinds of relationships with other people, and 2) various relationships with value systems. Both of these actions are born from the fundamental, or rather "inherent", needs for agency and communion. Part of the motivational properties of legacy can therefore be said to be enclosed in these two needs that form one's personal life meaning. Yet, this only leads to another question: why do people have these needs? The answer to this will be provided in the next part.

The workings of the legacy reminder: death awareness and reflection

This study argues that the underlying source of motivation that creates argentic and communal needs is death. This means that human awareness of their own mortality is of fundamental importance in explaining people's behavior. In adopting this view, this study draws upon important bodies of work in psychology called the Terror Management Theory (TMT) (Greenberg, Pyszczynski, & Solomon, 1986) and the Generativity theories (Erikson, 1950).

Both theories discuss the impact of death awareness on people's life, but each theory comes to different conclusions. TMT states that death awareness is translated into fear and self-serving defensive reactions whereas the Generativity theories predict productive, creative, generative behavior (Wade-Benzoni & Tost, 2009). Some psychologists have recently been pondering about why there is such a difference between the theories (Cozzolino, Staples, Meyers & Samboceti, 2004; Grant & Wade-Benzoni, 2009).

Grant and Wade-Benzoni theorized that the different effects that thoughts of death have on people can be attributed to the concepts of anxiety and reflection. The principle thought is that in many cases death leads to fear and attempts to suppress that fear, but in other situations it may lead to a fundamental rethinking of one's life. This discrepancy can in turn be explained by the degree of exposure to the mortality cue, i.e. how long is someone aware of death in his mind. On the one hand, a short, sudden exposure to death, when reading in the newspaper about a terrible accident for example, results into death anxiety: people become afraid when they think of the end of their lives and instead of contemplation, they respond by suppressing the death related thoughts, pushing them out of their consciousness. A long, chronic exposure on the other hand, for example in the case of illness of a relative or certain professions, causes death reflection: people "contemplate their meaning and purpose, and review how others will look upon them after they have passed" (Grant & Wade-Benzoni, 2009, p.605).

The latter notion of death reflection then ties with the Generativity theories that were first developed by the psychologist Erik Erikson. The most prominent thought is that when people can overcome their fear of death, instead of denying it, they strive to make a meaningful contribution to the next generations (Grant & Wade-Benzoni, 2009). This is possible because the shocking effect of death wears of over time: a person becomes habituated to the stimulus or becomes less sensitive to its effects. It is then that people become capable of looking death in the eyes and feel , in the words of Cozzolino, Staples, Meyers and Samboceti, "a sense of realization or learning of some important truth, as well as a meta-awareness of the life they had been living" (2004, p.289). Instead of death then being a source of fear, it becomes a source of learning in order to live a better life according to one's own standard in the time that is left. This betterment then often leads to contributions that have a lasting impact on other people and allow for personal connections with them. Reflecting upon death then increases motivation to act pro-socially, by helping, protecting and promoting the well-being of another.

Indeed, the above is consistent with the thoughts that a person has when considering his legacy. He too wants to leave a lasting impact (achievement) and establish relationships with others (affiliation). Death reflection therefore generates a legacy concern that makes people behave more pro-socially towards others. However, this is not exactly the way in which legacy reminders create the legacy concern. In this case, there is no long exposure to mortality cues but instead a stimulus of a short duration, very much in line with the Terror Management Theory.

The workings of the legacy reminder: death anxiety

The basic premise of TMT holds that the fear of death underlies most of human behavior. This idea was first coined by cultural anthropologist Ernest Becker (1973, as cited in Dickinson, 2009). He states that "human beings are predisposed to suppress thoughts of death to manage anxiety about the inevitability of mortality" (Dickinson, 2009,p.2). Having thoughts of death, Becker claims, is so costly that most people attempt to deny death. That is, the repression of death related thoughts by putting them away outside of consciousness, for it is the awareness of one's own mortality that is most difficult to cope with. One way of coping is focusing on socially created systems of meaning in which they can strive for self-esteem. In practice, this boils down to the adoption of particular worldviews and values that prescribe what is good to do, and from this it then becomes possible to derive self-esteem and create a meaningful place in the world. Another way to cope with thoughts of death according to Becker is projecting a "power and importance onto something larger that will save us" (Dickinson, 2009, p.3). Becker's ways of repressing thoughts of death then seem to relate closely to Bakan's concepts of agency and communion that create personal life meaning. The one crucial difference however is that Becker sees these concepts as necessary for the denial of death.

This rather philosophical idea was then picked up by the psychologists Pyszczynski, Greenberg and Solomon (1986), who desired to put it up for empirical scrutiny. In such a way, the Terror Management Theory was created. In accordance with Becker, this theory holds the denial of death to be of utmost importance in human motivation: humans are aware of the inevitability of death which creates an existential terror that needs to be controlled. It then expands on Becker's theory by positing several testable hypotheses that have been supported by several hundred's studies over the past 20 years (Pyszczynski, Greenberg, Solomon & Maxfield, 2006). Specifically, five relevant hypotheses have been examined. Firstly, research showed that increasing a person's self-esteem decreases the chances of becoming anxious when thinking of death. Secondly, small, subtle reminders of death cause more positive reactions to those who support a person's worldview and values (in-group) and more negative reactions to those who oppose it (out-group). Thirdly, strengthening self-esteem, through the validation of one's worldview, cancels out the previous effects. Fourthly, this effect also works the other way around. Boosting self-esteem decreases the accessibility of death related thoughts, whereas threats to self-esteem are known to augment the accessibility. Fifth and finally, providing people with evidence of the existence of a literal (that is to say, not a symbolical) afterlife eliminates the impact of death related thoughts on self-esteem and worldview (Pyszczynski, Greenberg, Solomon & Maxfield, 2006). Apart from the findings themselves these studies showed the prevalence of death in daily life as a whole

plethora of stimuli can be used to generate thoughts of death in experiments. Among others subliminal priming methods, texts and poems containing death related messages, videos displaying images of death, or even walking past a cemetery have been shown to elicit a behavioral response (Pyszczynski et al., 2006; Fritsche et al., 2009).

The usefulness of these findings is their wide applicability: every type of worldview or value system and the self-esteem derived from it is in principle susceptible to the influence of death related thoughts or mortality salience, the mere presence of death. Therefore, TMT can be used to explain social phenomena such as prejudice, nationalism, evaluative biases, and greed to name a few. However, Vail et al. (2012) claim that TMT has traditionally been too much focused this negative side of the presence of death as something that fuels "the dark underbelly of human social functioning"(p.1). Instead, these researchers stress that TMT could also present more positive messages, that is those outcomes that show that when under mortality salience people try to minimize harm to the self and other, and promote well-being on different domains. The trick to using death anxiety in a more positive fashion is the fact that individuals will try to reinforce a worldview that is positive for others. Indeed, under mortality salience a person may then become greedier, because money is of value to him (Kasser & Sheldon, 2000). However other studies show that people who value nature and the environment will exhibit behavior that is aimed at protecting these values (Vess & Arndt, 2008; Fritsche & Häfner, 2012). It is therefore of great importance to ascertain that the mortality salience effects someone with a worldview that is beneficial to others. In fact, Cialdini et al. (1991) in their norm focus theory suggest that a person can hold multiple sets of values that determine behavior to the extent that emphasis (focus) is placed on the one and not the other (1991). Using this theory Fritsche, Jonas, Kayser and Kornayi (2009) demonstrate that when pro-environmental norms are made salient people are more likely to display more positive attitudes towards the environment and moreover act accordingly. In one of their experiments, participants to whom an environmental norm was salient would pick reusable cups over disposable cups. This experiment suggests that people have several worldviews and values and they will defend one of them under mortality salience.

In a similar fashion to most experiment within TMT, legacy reminders also seek to use mortality salience, the sudden presence of death, to incite death anxiety. Also, like the experiments above, legacy reminders attempts to use this anxiety for a positive cause: beneficence toward future others. The way in which it does this is quite unique, in the first part of the mechanism the fear of death spurs people to deny the terrifying thoughts, and they do so by trying to boost their self-esteem and their feelings of affiliation with others by relating to a specific worldview. In the second part people are offered an opportunity to leave some form of legacy, which allows their meaningfulness to symbolically persist through time, similar to people who are offered an opportunity to behave in favor of the environment. In order to then gain the psychological security of legacy in the face of death they exhibit pro-social behavior towards future others. The legacy reminder then is that which induces some form of death anxiety in order to generate a legacy concern, which should then be given an opportunity to materialize into beneficence towards others.

However, Wade-Benzoni, Tost, Hernandez and Larrick (2012) point towards an interesting option: would it be possible to use other mechanisms than death to create a legacy? Especially since instilling death anxiety is inappropriate and undesirable in many policy situation, it would be interesting to examine whether options exists to generate legacy concern in a positive way, by reminding people of how one can live a meaningful life and how this can be passed on to others. Some of the evidence below points in this direction.

Empirical support and anecdotal evidence

Even though the theoretical rationale of legacy reminders draws upon the well validated findings of TMT, it is imperative to know whether it withstands empirical testing. Two papers by Wade-Benzoni provide the little known support for this explanation. In 2009, Wade-Benzoni,Tost, Hernandez and Larrick conducted a study in which they showed that mortality salience could reverse intergenerational discounting. When death related thoughts were induced people acted more generously towards other in the future than others in the present.

In a later study in 2012, the researchers conducted two experiments to test the relationship between mortality salience, legacy and pro-social behavior (Wade-Benzoni, Tost, Hernandez &Larrick, 2012). In the first experiment, they demonstrated that similar to their previous study, those primed with death behave more pro-socially towards future generations than those participants in the control condition. Moreover, participants who were primed with death displayed specifically more generosity towards others in the future than towards others in the present. In a second experiment Wade-Benzoni and colleagues set up a scenario in which the participant had to attribute resources to either himself in the present, himself in the future, another in the present or another in the future. In this experimental setup it was again shown that those who were primed with death were nicer to future others (i.e. they attributed more resources) than to other groups. Moreover, those in the death prime condition exhibit less beneficence towards themselves in the future than those in the control condition. In these experiments, death priming consistently lead to more beneficence towards others in the future, implying that indeed death priming activates a form of concern for the future (and leave a legacy) and that people therefore spend more resources on those in the future than others now.

Although empirical evidence is not very extensive as of yet, there are plenty of examples of the use of legacy reminders in society. Several websites provides anecdotal evidence for the use of a positive legacy reminder. These sites try to convince visitors to do something meaningful with their money and give it to a charity as part of their legacy (here meaning a monetary gift after death). These websites want to encourage people to donate money to a charity as part of their will and stress that their contribution would have a lasting impact on those they would help[47]. Another particularly striking example of the death related legacy reminder this time, is a 2011 Dutch advertising campaign meant to raise attention and money for a deadly, yet little-researched motor neuron

[47] For several examples, please visit : http://www.rememberacharity.org.uk/; http://www.legacytrustuk.org/; http://www.leavealegacy.org/

disease. Large posters were suspended in train stations and other crowded public areas and showed a face looking intensely at the viewer. Underneath this face there was written "by now, I will have died" (Dutch: "Ik ben inmiddels overleden"). This campaign makes viewers realize that this poster is that person's legacy, his way of projecting his message into the future. The fact that these people are dead and used their lives for this last effort should then mobilize people to make a lasting impact on others' lives by donating money for research.

A.5.4 Ranking, Competition, and Tournaments

Prestige is used by Harbaugh (1998) to describe the utility that an individual derives from making his donations publicly known. Ariely et al. (2009) term this propensity of an individual to be concerned about other people's opinion and approval image motivation. This term incorporates the need for acknowledgment and respect by the others. Therefore, an individual who strives for social approval should stick to the norms of the community. Pride and shame could be other motivations for donating when identities of individuals are revealed (Andreoni & Petrie, 2004). Shame is described as an emotion associated with one's negative evaluation either by the self of others due to the fact that he has not met certain criteria regarding what is good, right, appropriate and desirable (Lewis, 1971). Thus, the individual tries to avoid this feeling. Pride, on the other hand, is a feeling of self-respect and self-value (Andreoni & Petrie, 2004) that the individual actively pursues.

The desire for social approval is one of the reasons why individuals will act more generously in public if their generosity is viewable by others (Hollander, 1990). It has been generally acknowledged that recognizing contributors by revealing their identity increases contributions to public goods (Andreoni and Petrie, 2004; Rege and Telle, 2004). Social groups, charity organizations and online communities publicize individuals' contributions for this reason, and very few contributions are actually done anonymously. Social recognition has also been found effective in disparate settings that include voter turnout and blood donation (Gerber et al., 2008; Lacetera and Macis, 2010). While there is agreement among researchers and practitioners that recognizing contributors has a positive effect, the reasons for this effect are less clear.

The organization of the societies following a hierarchical structure is prevalent in almost all societies, so a strong preference for higher positions in social ranking is likely to be an important motivation of human social and economic behaviour (Barankay, 2012). This preference is also likely to influence the way in which we evaluate our outcome and the outcome of others, and finally the way we choose. Rankings and league tables, where people are ranked relative to others in terms of a performance measure, are a pervasive feature of life (e.g. employers use them to measure employee performance and determine bonuses and promotions) (Grote, 2005). Beyond the monetary benefits that may go along with high rankings, it has also been argued that people may care about their ranking per se, even when rankings have no financial consequences, also called *rank incentives*, as they directly affect self-image (Benabou & Tirole, 2003; Köszegi, 2006) and convey status (Moldovanu et al, 2007, Besley & Ghatak, 2008). When individuals undertake actions in order to increase their self-image when faced with the ranking incentive, the motivation to undertake this action is intrinsic. For ranking to affect self-image and

convey status it is necessary that other people are aware of the rank of the individual. Without this naming and shaming there is no incentive for the individual to make the effort to increase his/her rank.

While social groups, charities and online communities endeavor to publicize all contributors' information, this is often difficult, if not impossible, for several reasons. First, when there are many contributors, publicizing the names of all of them may not be feasible. In this case, organizations that rely on philanthropic donations often publicize the names of the largest contributors, e.g. by naming a building after the highest contributor or by publicly announcing contributors in categories by size of contribution (Harbaugh, 1998; Andreoni and Petrie, 2004; Li and Riyanto, 2009). Second, it is improbable that every member of the social network will view all of the contributor's information, especially when the list of contributors is long. Organizations may recognize all contributors by publishing lists on websites and in other media, but it is not clear that this information is always viewed due to the time and effort that must be spent in order to locate information about specific contributors.

Samak and Sheremeta (2013) find in a recent laboratory experiment that contributions to a public good are significantly increased when contributors are recognized (i.e., photos and names of all contributors are displayed after the contribution stage) relative to when contributors are not recognized. When viewing information about contributors is costly, there is no significant difference in contributions as compared to the case where all contributors are recognized by default, suggesting that just the possibility of being recognized is sufficient to drive the increase in contributions. This effect holds even though the identities of contributors are viewed less than 10% of the time. They also pinpoint which information is most effective at increasing contributions. Recognizing only the highest contributors is not significantly different from not recognizing contributors, while recognizing only the lowest contributors is as effective as recognizing all contributors. This finding suggests that it is the fear of shame, rather than the anticipation of prestige, that drives the identification-related increase in contributions in their experiment.

Also other evidence shows that naming and shaming has a positive effect on pro-social behaviour. For instance, in 2001, the problem of long waiting lists of hospitals in England was approached in a different way: failure resulted in sanctions in the form of the naming and shaming process. Besley, Bevan, and Burchardi (2009) analysed the effect of this naming and shaming on the waiting lists of hospitals in England. They found that this policy did indeed reduce waiting times in England. Naming and shaming is also used as international pressure to increase human rights (Hafner-Burton, 2008; Murdie & Davis, 2012).

The effect of the ranking incentive on firm behaviour

While the non-monetary rewards (pride, image, prestige) or punishments (shame) are relevant to all individuals, the fact that managers have more visibility in the organization and are accountable to the stakeholders for their actions, makes acquiring reputation even

more important for them. Visibility of managerial actions is something that follows directly from the position in the hierarchy that they occupy. Since the managers are the most visible members of an organization and outsiders see them as the organization itself, it is their task to present with their actions the organization's core values and purpose to the world (Scott & Lane, 2000). Because of this higher visibility and higher level of interaction, managers are more likely to identify themselves with their organizations. Besides achieving the desired corporate image outside the organization, managers' visibility affects their decisions within the organization itself. A direct relationship exists between power and visibility – the more powerful a manager is, the more visible his actions will be (Ortega, 2003). Once visibility increases, managers realize that they are more accountable for their decisions. Consequently, they will exert more effort in increasing the value of the firm and the decisions they make will be balanced against shareholders' interests because of career concerns.

Reputation combines everything that is knowable about a firm. As an empirical representation, it is a judgment of the firm made by a set of audiences on the basis of perceptions and assessments that are assembled and made available via a ranking system, which defines, assesses, and compares firms' reputation according to certain predefined criteria (Schultz, Mouritsen & Gabrielsen, 2001). So it in the interest of the manager to make sure that his firm is highly ranked in order to receive a high reputation. Since investing in CSR can be viewed as a form of reputation building of a firm (McWilliams et al., 2006), the manager who made the decision to invest in CSR can thereby increase his own reputation when it becomes visible that the firm is performing better than before the CSR investment decision. It even appears that a higher ranking on a CSR-rating list increases the firm's financial performance. In their research, Barnett and Salmon (2012) examine empirically the relationship between CSR and financial performance. The method of rating the CSP (Corporate Social Performance) for the sample firms is the KLD rating. Publicly traded firms are tracked by Kinder, Lydenberg, and Domini (KLD). KLD is an independent agency with a long history of tracking, and rating, firms based on a number of corporate social responsibility dimensions[48]. Figure 1 graphically depicts the non-monotonic, curvilinear relationship between social and financial performance.

A.6 Evidence on Effects Sizes of Nudges in Related Areas

An illustration of the effectiveness of ***framing*** is provided by a recent paper by Bertrand, Karlan, Mullainathan, Shafir, and Zinman (2010). They quantified the importance of theoretically-grounded psychological cues in dollar terms by partnering with one of the largest banks in South Africa to offer new loans to existing clients, via letters that varied both the interest rate offer and other psychological cues. In particular, they varied the number of different potential loans that were presented (to test whether greater choice could overload decision-making), how the interest rate was compared to some market benchmark, the race and gender of the person in a photo on the offer letter, the expiration

[48] Information about this database is available online at http://www.kld.com/socrates/indes.html

date of the offer, whether the offer was combined with a promotional giveaway, and whether the letter mentioned suggested uses for the loan. They found that consumers that had been offered lower interest rates were much more likely to take up the loans. They also found, however, that any one psychological cues could affect take-up by almost as much as a one to two *percentage point* change in the *monthly* interest rate. Allcott and Mullainathan (2010) argued that these findings are striking in a cost-benefit framework: psychological cues cost very little, while price changes (e.g. subsidies) cost a lot.

Considering the effects of ***default options*** Madrian and Dennis Shea (2001) found that participation rates in a corporate retirement savings plan jumped from 65 percent to 98 percent when the default option was changed to enrollment from non-enrollment, showing the substantial power of the default setting. Furthermore, since only a handful of employees opted out of the program once they were automatically enrolled, this suggests that setting enrollment as the default option was "correct," in the sense of enrolling the vast majority of people in the option they actually wanted.

Appendix B: Detailed Overview of Experimental Studies

B.1: An Experimental Study on the Effects of Legacy Reminders

Experimental Design and Procedures

In the experimental laboratory, the baseline treatments for *legacy reminders* in non-strategic settings were designed as follows: (1) After having filled in a short general questionnaire (inquiring about, for example basic, demographics such as age, gender and nationality), participants received one of three legacy treatments: positive, negative, or neutral (control group). The treatment consisted of reading one of three newspaper articles depending on the specific condition that either primed them with a negative legacy reminder (death cue), a positive legacy reminder (meaningful life cue), or an unrelated topic (control condition). In order to induce priming effects newspaper articles were used (see appendix). Similar to a previous study (Wade-Benzoni, Tost, Hernandez & Larrick, 2012) participants in the death prime conditions read an article titled "Person killed in aircraft brake failure accident" that was meant to create death anxiety. This article discussed an airplane crash on a highway killing one person. Additionally, in the control conditions participants read "Has Russian math whiz solved $1M puzzle?" which described a Russian mathematician who had published the solution of a renowned math problem on the Internet. However, in order to create thoughts of legacy without death, a specific prime had to be developed for this experiment. In the positive legacy conditions then, participants read an article titled "Lexington celebrated birthday local hero" that described how a community hero gave meaning to his live by dedicating himself to his town. After reading, participants were asked to comment on the writing style used in the article. (2) After this priming stage, we administered two non-strategic behavioural measures in order to assess pro-social Behavior of participants and whether it was influenced by the specific legacy reminder they received. One behavioural measure assessed participants' trustfulness and trustworthiness by using a hypothetical trust game. Our main behavioural measure assessed participants' social preferences (altruism) by using a so-called dictator game, in which participants unilaterally decided how to divide their final experiment earnings (€12) between themselves and a charity. A second manipulation consisted of a change in the text on the flyer that promoted the charity (see Appendix C2). Participants in the present-other conditions read a description of a charitable organization that provided solar panels for people in sub-Sahara Africa to relieve poverty. The organization was described as helping to provide the immediate needs and survival of the recipient. In the future-other conditions on the other hand, the same charity was described somewhat differently, focusing instead on the long-term effect by stressing how a donation will help future generations to develop.

Between these two behavioural measures participants answered several questionnaires in order to check for pre-existing differences in the sample as well as giving the prime some time to take effect. The questionnaires included a generativity questionnaire (McAdams & de St. Aubin, 1992), a survey on regulatory focus (Lockwood, Jordan & Kunda, 2002), and a questionnaire about public service (Kim, 2011). Moreover, in the control and death anxiety conditions, participants also answered a questionnaire assessing death anxiety (Templer, 1970). The questionnaires used in the experiment were all used in previous studies and are well validated. These questionnaires were secondary to the actual manipulations and served to check for pre-existing differences between groups that may have been the cause of possible effects found in the experiment. The design is visualized in Figure B.1.1:

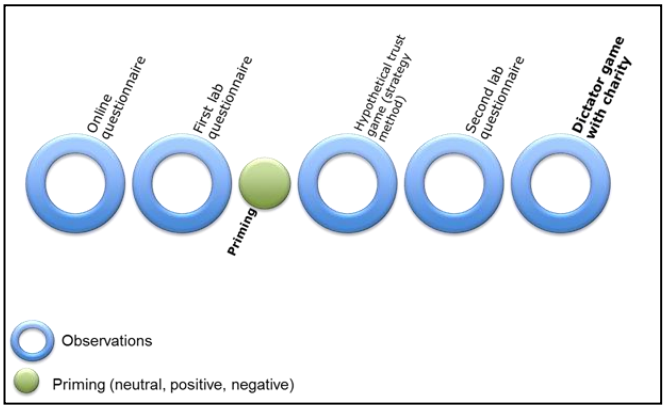


Figure B.1.1: Sequence of treatments in the "legacy reminder experiments"

Hundred-and-twenty-five (43 male and 82 female) students at Utrecht University, the Netherlands, agreed to participate in the experiment. The age of the participants ranged from 18 to 35 with a mean of 22. The participants were paid 12 Euro for their efforts. The participants were all subscribed to an online data base and received invitation to the experiment by e-mail. Those willing to participate registered for an experimental session. No participants were excluded from the analyses. The experiment had a 3 (Positive legacy prime vs. death prime vs. neutral prime) by 2 (present recipient vs. future recipient) between-participants design. At the beginning of the experiment, all participants who were in the same condition were each seated behind a computer. The instructions and materials needed were in front of them on their desk or were provided by the computer. The experimenter's only task was to make sure that the instructions were clear and that all participants would stick to the rules of the experiment. No further communication between the experimenter and the participants was necessary.

Hypotheses

Based on the literature study (see Appendix A.5.3) the following hypotheses can be formulated:

(1) Participants in the death prime condition give more to future-others,
(2) Participants in the control condition give more to present others, and
(3) Participants in the legacy prime condition give more to future-others.

Results

Given the 2x3 between-subject design, the analysis focusses on comparing the means of 6 groups in total. Selecting Prime and Frame as independent variables and using amount of money donated and frequency of donation alternatively as dependent variables, the main direct effects of just Prime or Framing were tested, and interaction effects between Prime and Framing. These interaction effects are important because subsequent pairwise comparisons are able to test whether all three main hypotheses find support in our data.

A two factor Analysis of Variance (ANOVA) revealed that our dependent variables, i.e. the amount of money and frequency of donation, are not normally distributed. Therefore direct effects are analysed by performing non-parametric test.

However, testing for the interactions between several variables is impossible using non-parametric tests. Therefore, as a first step, the two ANOVAs were conducted in order to assess the existence of interaction effect that could confirm the hypotheses. Promising results from these ANOVAs are then followed by more focused non-parametric tests that do not assume normality or homogeneity of variance, so as to gain more reliable results. The first two-way ANOVA revealed no significant main effects of Prime or Framing on the amount of money that was donated, nor was there a significant interaction effect between these two independent variables. The second two-factor ANOVA was conducted to assess for main and interaction effects of Prime and Framing, but this time using the frequency of donation as a variable. Again no effect was found for Prime and no interaction effect could be detected for the two independent variables.

However, it could be carefully concluded that there is an effect of Framing on the *frequency of donation* in a group regardless of what prime they received, $F(1,119)=3.171$, $p=.078$. Specifically, participants in the present-other conditions ($M=.537$, $SD= .062$) donated more often than the people in the future-other conditions ($M=.377$, $SD=.065$). It is important to note that participants who donated received a score of 1 whereas those who did not received a score of 0. Consequently, the mean of each group lies between 0 and 1 as the means consist of the amount of people who donated divided by the total amount of people in the group. Therefore a mean of .537 indicates that 53.7% of the people in present-other donated to charity as opposed to 37.7% of the people in the future-other condition.

In addition, because of the inability to detect differences, two other ANOVAs were conducted to test whether gender is a modulating factor for beneficence. The first three-factor ANOVA examined whether a combination of one or both of the independent variables Prime and Framing with Gender has an effect on the amount of money donated. The analysis revealed a significant interaction effect between Gender and Prime, $F(2,113) =3.666$, $p=.029$. Also the second three-factor ANOVA tested for the same effects but this time for the other dependent variable. It was discovered that there was an interaction effect between Gender and Prime on the amount of people who donated, $F(2,113)=5,948$, $p=.003$. An inspection of the means of both dependent variables (Table 1) reveals that, regardless of Framing, more women than men donated money in in the death prime conditions, and they donated a higher amount. Subsequent t-tests shows that

this difference is significant: t(35)= 3.125, p= .004 and t(35)=2.057, p=.047 respectively. Figures B.1.2 and B.1.3 below clearly display the discrepancy between men and women.

	Men		Women	
	N=14		N=23	
	M	SD	M	SD
Amount of money donated after negative prime	.071	1.54	2.35	2.71
Frequency of donation after negative prime	.214	.426	.696	.470

Table B.1.1: Means and Standard deviations for men and women

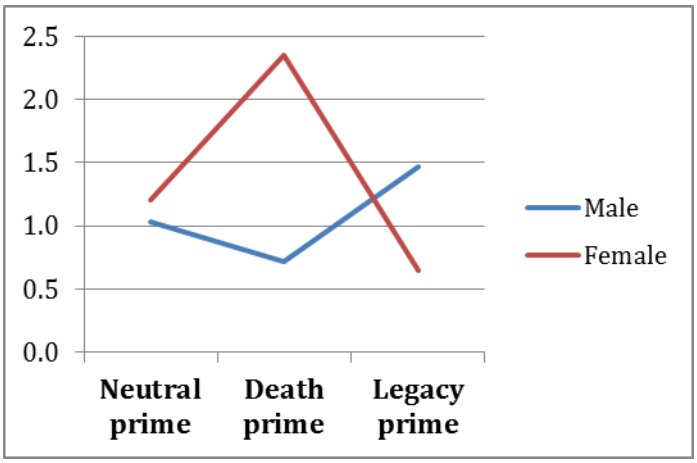


Figure B.1.2: Mean amount of money donated for men and women

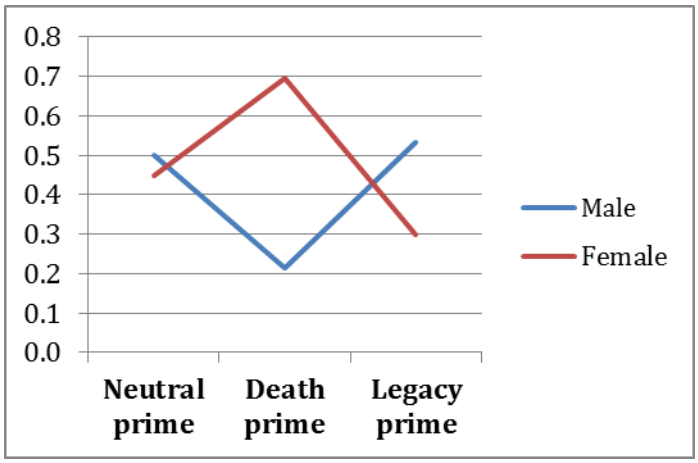


Figure B.1.3: Mean frequency of donation for men and women

Assuming that the ANOVAs and t-test performed above at somewhat unreliable in their outcomes, several tests with significant outcomes were repeated using non-parametric tests that do not assume normality or homogeneity of variances. These tests assign a rank to each value in the data set and calculated whether the differences between the mean ranks of each group are significant. Using a Man-Whitney U test, the difference between the mean ranks in negative prime conditions and positive prime conditions were assessed for both the amount of money and frequency of donation. Similar to the t-test in the previous section, the results were significant. Women who had been in the negative prime conditions donated significantly more money than women in the positive prime condition, p= .001 (See Table B.1.2 for mean rank scores). Similar results were found for frequency of donation, p=.006 (Table B.1.2). Next to that, two other Man-Whitney U tests were conducted to check the previously found significance values. The first test revealed that there was a significant difference between both amount of money donated and frequency of donation between men and women in the negative prime conditions. For the amount of money donated, the mean rank of women higher than for men, leading to

significant difference, p=.014 (see Table B.1.3 for mean ranks). For the frequency of donation, women again had a higher mean rank than men, which was a significant difference of p=.007 (see Table B.1.3). The last test assed the relationship between framing and frequency of donation. The mean ranks of this test were 68.20 for present-other and 57.54 for future-other, leading to a probability value of p=.072

	Legacy prime	Death prime
	N=30	N=23
Mean rank per group for the amount of money donated	21.63	34
Mean rank per group for frequency of donation	22.45	32.93

Table B.1.2**:** Mean rank score for women

	Men	Women
	N=14	N=23
Mean rank per group for the amount of money donated	13.82	22.15
Mean rank per group for frequency of donation	13.46	22.37

Table B.1.3**:** Mean rank score for men and women in the death prime conditions

The scores from the questionnaires where then used to check whether differences in scores of regulatory focus, public service, mood, or death anxiety could explain the large difference between men and women, however no significant difference between men and women on these scales was found.

Finally, the results from the decision game were analysed as an alternative measure of beneficence. Given that this task preceded the Framing manipulation, it was impossible to look for interaction effect. A one-way ANOVA using Prime as independent variable and alternatively Trusting and Honouring as dependent variable was conducted, however no significant results were found.

Discussion

Generally, it can be stated that none of the research hypotheses are confirmed by the experiment. There appears to be no interaction effect between Prime and Framing, therefore people in the death prime condition did not give significantly more or more often to future-others than they did in present-other conditions. Neither was there a

reversed tendency for the control group to give more to present-others instead. Moreover, the legacy prime, which was thought of as an alternative to the death prime, did not interact with framing either to increase beneficence. These findings then do not correspond to previous results of Wade-Benzoni, Tost, Hernandez and Larrick (2012). Their experiment showed that beneficence arises from an individual's personal desire to overcome the fear of death by casting him or herself into the future by means of a legacy. Yet no such pro-social motivation was triggered in the present experiment.

A reason for these contradictory results could be due to the differences in dependent variables. Even though the independent variables were the same, the present experiment used real life donations as one of its dependent variables. In the experiment of Wade-Benzoni, Tost, Hernandez and Larrick,(2012) the researchers instead used semi-hypothetical rewards as a measure of beneficence. Participants in their experiment were entered into a lottery to win $1000 and were asked how much they would donate in case they won. There is a possibility that receiving a real reward, with the feeling that you earned it, is different from maybe getting it if you are lucky. Moreover, the amount of $1000 itself allows for different donations than €12. Simply because of the size of the amount in the Wade-Benzoni experiment, participants have much more options in choosing their donations and given the fact that they did not yet receive the actual money, participants were not restricted to coins and notes as they were in the present experiment. Therefore donations in this experiment were more difficult to scale as differences were necessarily smaller. This could have resulted in a failure to observe the predicted effects. It is then conceivable that the desire to leave a legacy to future-others is only a useful manipulation when it concerns relatively large sums of money.

Another option for these findings lies in the sample sizes. Indeed, the sample sizes of the current study are quite low, however Wade-Benzoni, Tost, Hernandez and Larrick had a sample of 54 participants in their original 2 by 2 experiment. This means that their average amount of participants per condition was smaller than the smallest group of the current experiment (15). Using so few participants means there could have been some characteristics which influenced the results instead of only the manipulation. Furthermore, scores in smaller samples are rarely normally distributed (hence this study used non-parametric tests), and the results of the ANOVAs reported by Wade-Benzoni and colleagues could be inaccurate.

A lack of empirical support for legacy reminders is unfortunate and some of the data in the experiment even argues for another explanation of beneficence. The fact that the present-other framing on its own affected the frequency of donations in a positive way is rather interesting. This seems to suggest that for some part, the donations were not so much motivated by a desire to leave a legacy, but rather the perception of direct need.

However, there are other findings that support the existence of legacy reminders, albeit in a different way. The significant difference between men and women who were primed with death is noticeable and shows two important observations: firstly, thoughts of death increase beneficence in some circumstances. This is unlike findings by Kasser and Sheldon (2000) who showed that thought of death cause greed, and more in line with

general thoughts about legacy by Wade-Benzoni. Secondly, the experiment implies that gender is an important variable in mapping out the effects of death primes. Women were found to be more affected by the death prime and donated more money and more often than men did. Moreover, women in the death prime conditions donated more and more often than those in the legacy conditions. Indeed, some studies show that women generally have higher levels of death anxiety (Dattel & Neimeyer, 1990; Pierce, Cohen, Chambers & Meade, 2007), yet the present study found no significant differences in the death anxiety questionnaires, only the donation effect.

The data for women then suggest that the fear of death did instill them with some form of concern for others which resulted in more beneficent Behavior. This other however could be both present- and future-other as the data shows. It does therefore not argue for legacy reminders being a unique way of increasing pro-social Behavior to future others specifically. Instead, it seems that the desire to leave a legacy activated by the fear of death can be realized by giving to any other person. Legacy based on death anxiety does therefore have the ability to counteract inter-temporal discounting (given the fact that there was no difference between present- and future-other), but this does not mean that the concern for present-others does not exist anymore. It is possible that others who are young or have an influence on young people offer just as much opportunities to leave a legacy to as others that do not exist yet. Especially the fact that the flyers with the framing manipulation contained a picture of two young men may have been important in this regard. Giving a donation to help people like them in immediate need impacts their lives in a big way, this could be perceived as an option to do something meaningful and leave a legacy, just as well as contributing to long-term improvement could (future-other framing). Even though there was no difference between the control conditions and death prime conditions, the effect of the latter prime on donations provides evidence against the idea that death primes lead to greediness at the very least. It is however difficult to explain why men react so differently from women, since no differences were found in the questionnaires included in the experiment. It can only be concluded that socialization processes work differently for both men and women and create different reactions to death anxiety.

Regarding the novel findings of this research, quite a few opportunities exist to further elucidate the workings of legacy reminders. In the first place, it would be useful to examine if legacy reminders do work where people have access to a larger amount of money for their donations. It seems that small sums of money may not be that suited for drawing out the effect. For example, field studies could be conducted implementing different primes on people who won a large prize in television shows or lotteries. It could even be possible to include a legacy manipulation on an energy bill to see if the amount of energy spent the week decreases.

Another direction worth exploring is the gender difference that resulted from priming participants with death. As from this experiment it seems that the prime has opposite effects in men and women, an option would be to find out why this effect exists. Examining women's attitudes towards donations or the statistics from charitable organizations about donations by women could be a way to start. Moreover it would be

possible to test for correlations between death anxiety in women and other variables that could related.

A third useful way of building this research would be to examine the possibilities for the use of a positive legacy reminder in the form of a legacy prime. This study showed that the prime was largely ineffective as a means of increasing beneficence, yet the usefulness of such a prime would be large given that reminding individuals of death might not be the most pleasant of manipulations. It is conceivable that the content of the newspaper article that served as a legacy prime did not make the notion of legacy salient enough. Investigating peoples' goals in life as well as the meaning of them could be a good way to increases knowledge of what elements are important in making trying to instill a desire to leave a legacy in a positive way.

Conclusion

The aim of this experiment was to investigate to use of legacy reminders for promoting individuals' regard for collective interest as well as intergenerational beneficence. It was theorized that instilling people with the desire to leave a legacy behind would be an effective way of reducing both temporal as well as social discounting. This reduction of the discounting effect was thought to bring the other closer to the self and make an individual more willing to either contribute to a public good or maintain one by not taking too much from it. Heightened levels of beneficence towards future others and more regard for the collective interest could then be a solution to social dilemmas in general and intergenerational dilemmas in particular.

The experiment conducted as part of this study found that it is difficult to use both death and legacy primes to generate a desire for legacy creation and increase the amount and frequency of donations to future others. However, using a death prime it was possible to create a difference in beneficence between men and women towards others in general. Yet even the levels of beneficence in women in this condition failed to rise above the levels of beneficence in the control group.

Although some form of success was achieved in generating a desire to leave a legacy in women, using the current experimental manipulations, it is not possible to increase people's regard for collective interest or intergenerational beneficence to above standard levels. Future researchers are thus recommended to more closely examine the gender difference and devise different experimental set-ups in order to find out more about this fascinating source of motivation.

B.2: An Experimental Study on the Effects of Commitment

Experimental Design and Procedures

In the experimental laboratory, the treatments for the *commitment* nudge in non-strategic settings was designed as following: (1) After having filled in a short general questionnaire (inquiring about, for example, basic demographics such as age, gender, and nationality), participants received one of two treatments: either, they received a commitment treatment (being asked whether they were planning to contribute any money to charity during the course of the following 12 months, and how much), or the control treatment (no such question included). (2) After this treatment stage, we administered three non-strategic behavioural measures in order to assess participants' time preferences in general, their social preferences in the future, and their present social preferences. The first behavioural measure assessed participants' time preferences using a technique that involves multiple price lists with real payments (sooner-smaller payments versus later-larger payments). The second behavioural measure assessed participants' social preferences (altruism, 'warm glow') in the future, using a technique of multiple price lists with real payments (sooner payments versus later payments that *included a charity donation*). The third behavioural measure assessed participants' present social preferences (altruism, 'warm glow') using a dictator game with real payments (fixed payment of €12 today, or €12 *minus charity* donation today). For the exact payment options of all three measures see the instructions of this experiment in Appendix B4. The design is visualized in Figure B.2.1:

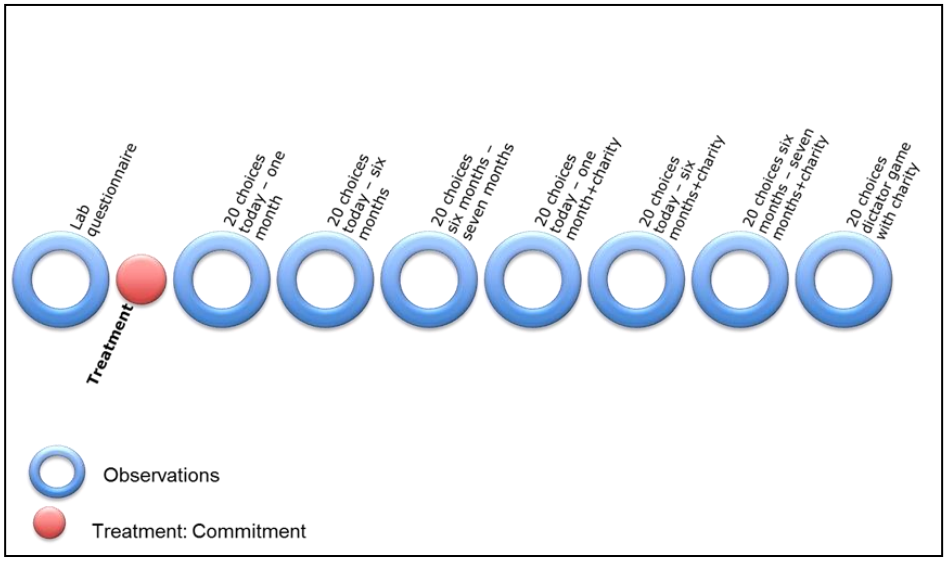


Figure C.2.1: Sequence of treatments in the "commitment experiments"

One of the choices participants made in the experiment was randomly selected for payment. In order to provide credible incentives, participants' trust in receiving their future payments needed to be ensured. According to Collor and Williams (1999) using

real payments decreases the mean and unexplained variance of the revealed discount rates, compared to using hypothetical incentives. In order to equate the transactions costs of the earlier and later payments (Meier and Sprenger, 2012), in the present experiment PayPal was used to transfer the money, even when participants decided for a payment on the day of the experiment. By eliminating payments in the lab, participants could not disproportionately prefer present in-lab payments, based on the perception that it would be more likely to actually receive the payment (Andreoni & Sprenger, 2012). If the participant did not have a PayPal account yet, PayPal automatically opened an account. Then the participants received an e-mail from PayPal after which they could claim the money, by having it transferred to their account. They received this e-mail either on the day of the experiment, or in exactly one month, or in six months, or in seven months, respectively. If their earnings involved a payment to a charity, then the payment was transferred to the charity of their choice on the specified date and the receipt was e-mailed to the participant. Furthermore, the participants were given the business card of Professor Rosenkranz. They were told that if any problems in receiving their payments would occur, they could call or e-mail the Professor, who would then hand-deliver the payment. This procedure was also used in the experiment of Andreoni and Sprenger (2012) to increase trust in future payments. Also, the participants were fully informed about the payment method prior to the experiment and were given the choice to opt out against receiving a small show-up fee. None of the subjects opted out.

Forty-seven (17 male and 40 female) students at Utrecht University, the Netherlands, agreed to participate in the experiment. The age of the participants ranged from 18 to 27 with a mean of 20. The participants were recruited using an online data base and received an invitation to the experiment by e-mail. Those willing to participate registered for an experimental session. At the beginning of the experiment, all participants who were in the same condition were each seated behind a computer. The instructions and materials needed were in front of them on their desk or were provided by the computer. The experimenter's only task was to make sure that the instructions were clear and that all participants would stick to the rules of the experiment. No further communication between the experimenter and the participants was necessary.

Hypotheses

Based on the literature study (see Appendix A.2 and A.5.1) the following hypotheses can be formulated:

(1) The consistency of participants' preferences for monetary benefits and non-monetary benefits over time is similar.
(2) Participants in the commitment treatment behave more pro-socially than those in the control treatment.

Results

To calculate the discount rates of the subjects, the switching point of their decisions from sooner smaller payments to later larger payments in each block is determined. The interest rate starts at 5% for the first decision in each block and then increases in 20 steps of 5% to 100%. The switching point is used to calculate the discount rates by using the interest rate corresponding to the given decision, e.g. if in Block A a participant switches

from the smaller sooner payment to the larger later payment at decision 15, where the choice is "Receive €12,00 today" or "Receive €12,20 in one month" we conclude that this participant has an annual discount rate of 20%.

The mean switching point of the participants in the control group of block A (decision 1-20) choosing the larger later option is at decision 14.70 ≈ 15 which is "Receive €12,00 today" or "Receive €12,75 in one month." The decision at 14.70 gives us a discount rate of 73.48%. In the commitment group the mean switching point to the larger later option 9.21 ≈ 9, which is "Receive €12,00 today" or "Receive €12,45 in one month", and corresponds to a discount rate of 46.04%. Accordingly the mean discount rates are calculated for all decision blocks for both treatments and displayed in Table C.2.1. Subjects' decision in Block G generates a score for their altruism (non-monetary benefit from pro-social Behavior, warm glow) in the present. The warm glow is measured as the percentage of 12 euro that an individual would give to charity today. In the control group the average of the warm glow in block G is 0.0696 = 6.96%, corresponding to giving €0.84 to charity today. In the commitment group the average of the warm glow in block G is 0.1979 = 19.79%, which corresponds to giving €2.37 to charity today. Table C.2.1 below presents all average discount factors as well as subjects' average warm glow, determined separately for the control and the treatment group for each decision block.

	Control	**Difference within group**	**Difference across Blocks**	**Commitment**	**Difference within group**	**Difference across Blocks**	**Difference between groups**
	(N=24)			(N=24)			
Block A	73.48			46.04			27.44^{+++}
A-B		5.87**			-1.25		
Block B	67.61			47.29			20.32^{++}
B-C		14.13*			10.21		
Block C	53.48			37.08			16.4
A-C		20.00***			8.96*		
Block D	63.7			57.29			6.41
D-E		-10.65*			1.25		
A-D			9.78^{++}			-11.25^{++}	
Block E	74.35			56.04			18.31
E-F		31.52***			9.37		
B-E			-6.74			-8.75	
Block F	42.83			46.67			-3.84
D-F		20.87***			10.62		
C-F			10.65			-9.59	
Block G	6.96			19.79			-12.83^{++}

*,**,*** indicate p<0.1,<0.05,<0.01 in the Wilcoxon matched-pairs signed-ranks equality test. +,++,+++ indicate p<0.1,<0.05,<0.01 in the Wilcoxon rank-sum test on unmatched data comparing discount rates between the two groups.

Table B.2.1: Summary of average discount factors and warm glow per decision block and treatment

From these discount factors we can also calculate the average present and future charity donations in the two groups. The eight's row in Table B.2.1. indicates that there are no significant differences between the two treatments when decisions concern future payments: In Block D, the control group donated on average €0,65 (5,416%), while the commitment group donated on average €0,55 (4,583%). In Block E, the control group donated on average €4,5 (35,83%), while the commitment group donated on average €3,30 (27,50%). In Block F, the control group and the commitment group both donated on average €0,45 (3,75%). In Block G, when decisions concern present payments the decisions of the two groups are statistically different: the control group donated on average €0.84 (6,96 %), while the commitment group donated significantly more with on average €2.37 (19,79%).

The non-monetary benefit from pro-social Behavior (warm glow) in the future is measured as the difference in discount factors between a block with selfish payments and a block with altruistic payments. Hence, if an individual has a discount factor of 75% in Bock A (requiring an interest rate of 75% to delay consumption for one month) and a discount rate of 50% in Block D (requiring a payment of 50% of her present income to go to charity to delay consumption for one month), warm glow is calculated to be positive (25%). The average values for control and the treatment group are presented in column 4 of Table B.2.1. A Wilcoxon signed rank sum test reveals that all values are not significantly different from zero.

A Fischer's exact test and a Kruskal Wallis test revealed that there is no significant difference in warm glow between the two groups (with and without commitment) when comparing decisions in Blocks E and F (choice between payments today or in six months, and choice between payment in six months or in seven months). When comparing decisions in Block D, average warm glow was significantly higher (Prob > |z| = 0.0546) in the control group. This finding contradicts the hypothesized commitment effect. At the same time, average present warm glow in Block G is with 19.79% significantly larger (Prob > |z| = 0.0620), in the treatment group compared to the control group. It seems that the commitment (treatment) has either no effect or a negative effect on future warm glow, but a positive effect on present warm glow (Block G).

Note further that subjects in the control group display relation between present and future warm glow that corresponds to hyperbolic discounting. Future warm glow is significantly smaller when comparing Blocks E and F (Prob > |z| = 0.0018), and Blocks D and F (Prob > |z| = 0.0084). While the difference between Blocks D and E goes into the opposite direction it is only weakly significant (Prob > |z| = 0.0789). It seems that the commitment increases the consistency of subjects' time preference regarding a warm glow.

We also confirmed the following robustness check: The warm glow in the future can also be measured differently than by comparing the discount rates in the decision blocks

including charity with the ones without it. The warm glow can be calculated as the percentage of 12 euro that an individual would give to charity in 12 months.

To calculate the warm glow in each block the row total (score) in each block is multiplied by the interest rate per step (5%). The warm glow in t+1 is the stated value in t+1 (1 months, 6 months, 7 months) minus the warm glow today, because the warm glow today would already have been given to charity today. To calculate the warm glow in block D, block E and block F, the warm glow in block G will thus be deducted from the warm glow in these blocks to get the warm glow in t+1. A Wilcoxon signed rank sum test reveals that all three values are significantly larger than zero). In the commitment treatment values are not significantly different from each other, in the control group they are different.

Theoretically the warm glow in t+1 is determined by the discount factor. The warm glow in t+1 should equal the warm glow today multiplied by the discount factor. This is not the case. All values, except xxx are significantly different from the theoretical value.

Warm glow	Session 1	Percentage	Session 2	Percentage
Block D-G positive WG	10	43.48	13	54.17
Block D-G no WG	12	47.83	7	29.17
Block D-G negative WG	1	8.70	4	16.67
Block E-G positive WG	10	43.48	13	54.17
Block E-G no WG	12	47.82	7	29.17
Block E-G negative WG	1	8.70	4	16.67
Block F-G positive WG	16	69.57	17	70.83
Block F-G no WG	7	30.43	5	20.83
Block F-G negative WG	0	0.00	2	8.33
The F-test does not report any significant differences at a 10% significance level or lower.				

Table B.2.2: Warm glow (positive, zero or negative) in t+1 for Session 1 and Session 2

A Fisher's exact test reveals that there is no significant difference between the warm glows in the two samples.

Discussion

Our first hypothesis stated that individuals have time inconsistent preferences. To test this hypothesis the average discount rates per block were calculated and compared. If participants would be time consistent, their discount rates would be the same in Blocks A, B, and C, since the interest rates used were the same in all time frames. If the delay was larger, the monetary increase would thus also be larger. The results show, just as the literature predicted, that most people do not have time consistent preferences. The discount rates in Block A are higher than in Block C in the control group, and also in the commitment group, while the time delay is one month in both blocks. Also, individuals' discount rates in Block A should be equal to the ones in Block B, and those in Block B

should be equal to the ones in Block C. This also does not hold for either of the two groups. Three different kinds of discounters were distinguished per session. Namely: hyperbolic discounters, consistent discounters and non-hyperbolic discounters. The control group seems to have more hyperbolic discounters than the commitment group.

Additionally, the 'discount factor' for the individuals' inter-temporal pro-social Behavior was obtained, which we defined as their 'warm glow', the non-monetary benefit from behaving pro-social, i.e. giving to a charity. The change in discount factors between Blocks (D-A, B-E, C-F) was calculated to determine the participants' warm glow. Unfortunately, the results do not show that the 'nudge' induced participants in the commitment group to have a larger warm glow than the participants in the control group.

Part A of the second hypothesis states that people will give more to charity even though their charity commitment is €0, because they are 'nudged' with commitment. First the control group and the commitment group are compared using a warm glow measure that takes into account the present warm glow. The percentage of people with a positive warm glow is larger in the commitment group compared to the control group. However, the difference between the control group and the commitment group is not substantially larger if we rule out the very patient people or not. It was also tested if the warm glow of people is larger in the commitment group when we distinguish between the three types of discounters. The two different types of warm glow calculations here were separated here. Using the first type of warm glow measure (using the blocks that elicit time preferences) there does not seem to be a big difference between the types of discounters, but the commitment group does show a larger frequency of having a positive warm glow. When taking the second type of warm glow measure (using the present warm glow) the consistent discounters seem to have more positive warm glow individuals than the other types of discounters. Furthermore, it was tested if individuals who have a strong benefit from giving respond more to the commitment 'nudge'. This was done by looking if individuals who have a positive warm glow, tend to give more in the commitment group. The results show that with both measures of warm glow, the commitment group has a higher amount of positive warm glow then the control group. But this result is larger when using the first measurement of warm glow (using the blocks that elicit time preferences).

The B part of the second hypothesis is that people give more to charity if they answered a positive amount (more than €0) to the charity commitment question. To see whether these participants respond stronger to the 'nudge', the 16 subjects who entered a positive charity commitment were compared to the 8 subjects who entered an amount of zero. Fischer's exact test and a Kruskal Wallis test revealed that there is no significant difference in warm glow (measured in the two different ways as described above).

Conclusion

What can be concluded from these experiments is that the commitment nudge does seem to have a weak effect into the desired direction but this is not strong enough to show any meaningful significant results. Direction for further research are to test the effect of a

commitment ‘nudge’ on greater scale hoping for more significance, since the results are mostly in the desired direction.

B.3: An Experimental Study on the Effects of Norms and Ranking on Individual and Managers Pro-Social Behaviour

Experimental Design and Procedures

The basic experimental design for the strategic setting used a standard Public Good Game (PGG) (which used a Voluntary Contribution Mechanism (VCM)), with a linear production function, framed in an environmental context. All participants per session (24-28) were divided into 6-7 groups consisting of 4 people each, who played with each other in the PGG. For two rounds of 10 periods participants were confronted with the following decision task: participants had to indicate (on the computer screen in front of them) how many experimental currency units (ECUs) out of an initial endowment they wanted to allocate to either their own private account or to a group "social account". The ECUs contributed by all four members of a group to the social account was multiplied by an efficiency factor (x=1.6) and then distributed evenly among all four members of the group. This means that as a collective, the group would have benefited most if each participant had contributed all of their money to the social account (collective rationality). However, at the same time, each individual member had an incentive to free-ride on the three other members' contributions and to contribute little or nothing him-/herself to the social account (individual rationality). The key measure of pro-social behavior (or lack therefore) in this game, therefore, was an individual participant's contribution to social account (in a given round). After the first round of 10 decisions, participants were rematched to a new group of 4 participants and confronted with the second round of 10 decisions. Their final payment depended on two randomly determined decisions, one chosen at random by the computer for each round. In each period, each participant had 20 experimental currency units (ECU) at his disposal, with 10 ECU converted at the end of the experiment to 3.00 Euro in real money. In addition, in all of these sessions, we used a second measure of pro-social Behavior. At the end of each session, participants could decide whether they wanted to donate a part of their earnings to a charity of their choice (Dictator Game; see above), from among four pre-selected charities that focused on the environment and green energy.

Social Norms

The treatment using *social norms* as reference points in this strategic decision-making setting was designed as following: After having filled in a short general questionnaire (inquiring about for example basic demographics such as age, gender), participants received one of two treatments: social norm information as reference point or no such information (control group). The social norm treatment consisted of information about an individual's contributions to the two (private and social) accounts in relation to a social norm (represented by the average contribution of the other members within the group). In addition to the informational feedback that participants received, they also saw a face on their computer screen that indicated whether they were above the social norm (smiley face for contributions higher than the group average to the social account) or below the social norm (sad face for contributions lower than the group average to the social account (see screenshots below).

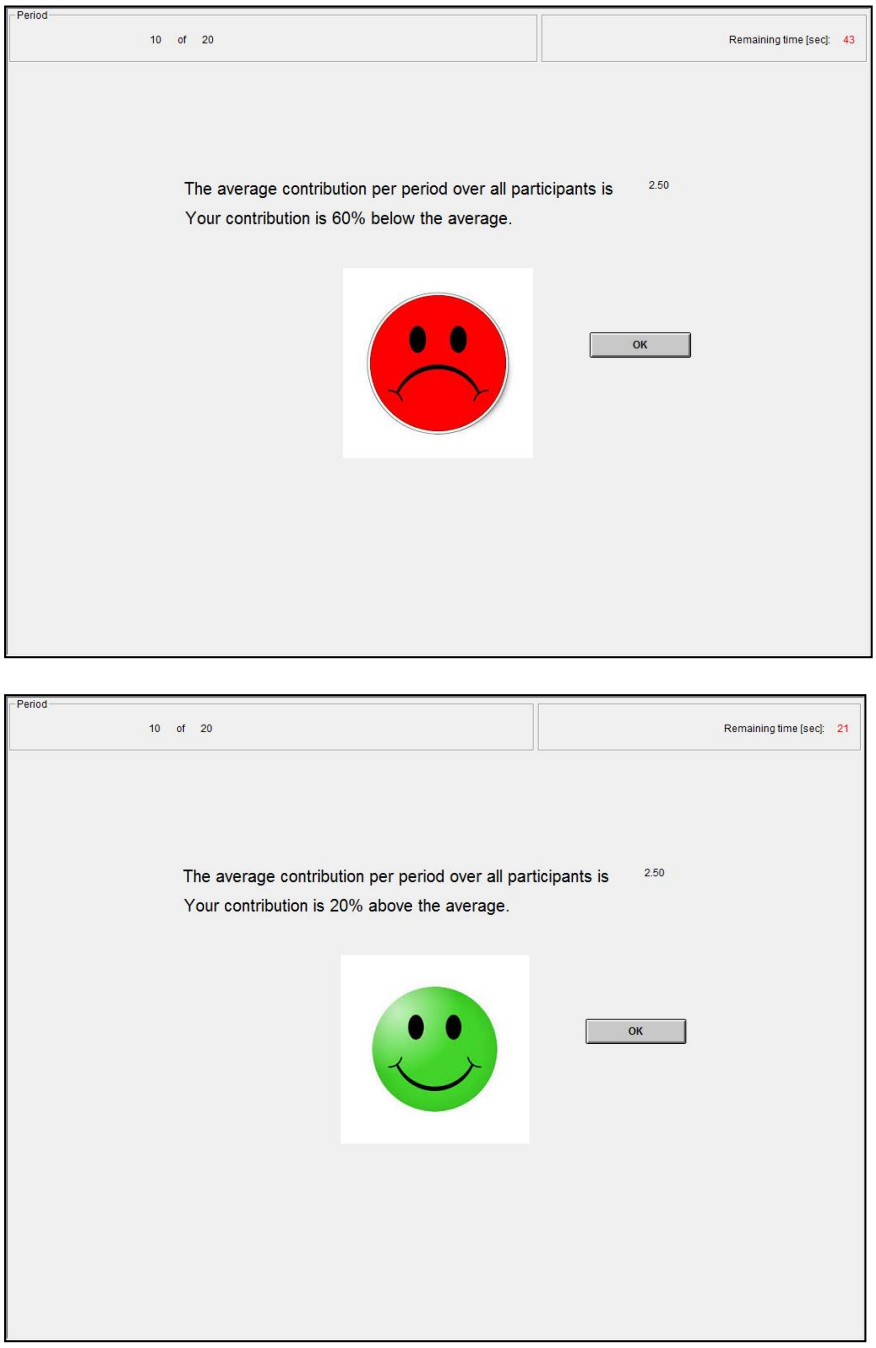


Figure B.3.1: Example screenshots of the social norm feedback

Ranking

The treatment using *ranking*, each participant was ranked within his/her group consisting of four members (with each group having been assigned a specific colour, e.g., red), depending on his/her contributions. Participants were informed at the beginning of the session that they would be publicly ranked at the end of each sequence of 10 periods. After each sequence of 10 decisions, each participant was informed on the computer

screen (see screenshot below) about his/her ranking within the group (from 1=highest contribution to 4=lowest contribution). In order to link the ranking to status and self-image concerns, it had to be made publicly visible. Therefore, each participant was asked to take the corresponding number out of an envelope lying in matching colours on his/her desk and raise it so that everyone in the laboratory could see the participant's position within the group.[49] Every group was asked to stand up separately, to increase the public visibility. After the experimenter has made sure that every participant has seen the other group members' rank (approximately 15 seconds), the participants could sit back and, after being rearranged randomly to a new group, continue with the next decision round, at the end of which they were ranked again.

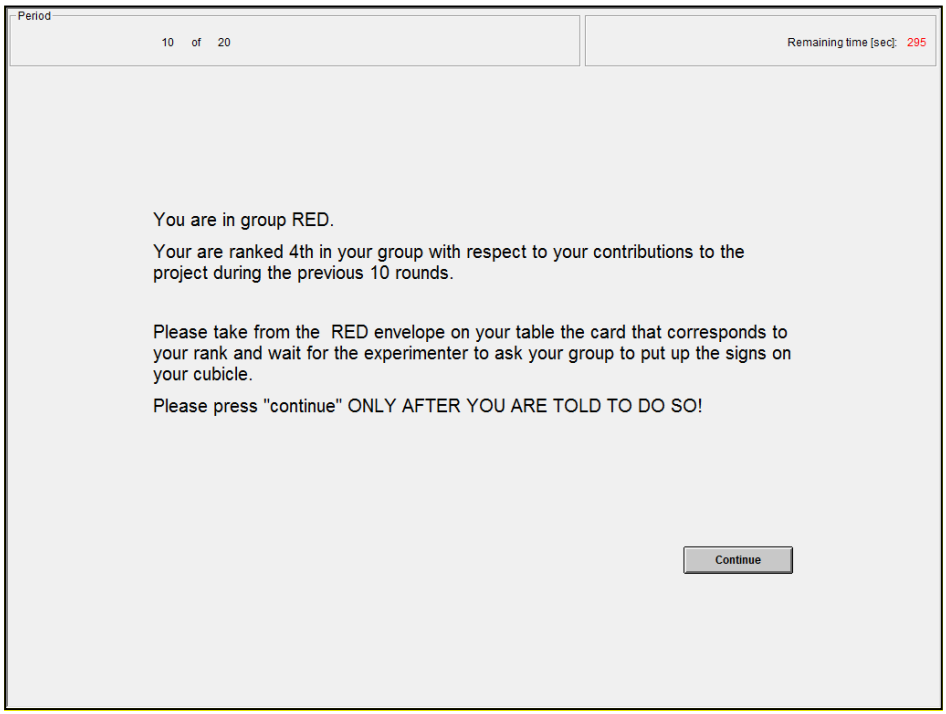


Figure B.3.2: Example screenshot of the ranking feedback

Managers Frame

At the beginning of some of the sessions, all participants were presented with a business frame (Elliott et al., 1998), that is, each participant was asked to imagine that s/he was a manager of a company and had to decide on the amount s/he would contribute to an environmental project. Participants were first presented with an article about the strategies of successful managers, followed by a set of questions about the particular business strategies (see text Manager Priming in Appendix B.4).[50] In addition, in order to mimic managers' accountability to shareholders, participants in these sessions were

[49] On top of the cubicles a clip was placed and the participants were asked to put their rank in the clip so it would be visible for all participants during the next 10 periods.

[50] This technique is equivalent to the technique used in the Legacy Experiments and is frequently used in psychological studies. It is applied to create an implicit memory effect (priming). Psychological research has repeatedly shown that exposure to a stimulus influences a response to a later stimulus.

informed that they would have to justify their decisions afterwards in writing. After taking a sequence of 10 decisions, participants in these sessions indeed had to write down justifications for their decisions, which the experimenters then collected from them. The design is visualized in Figure B.3.3:

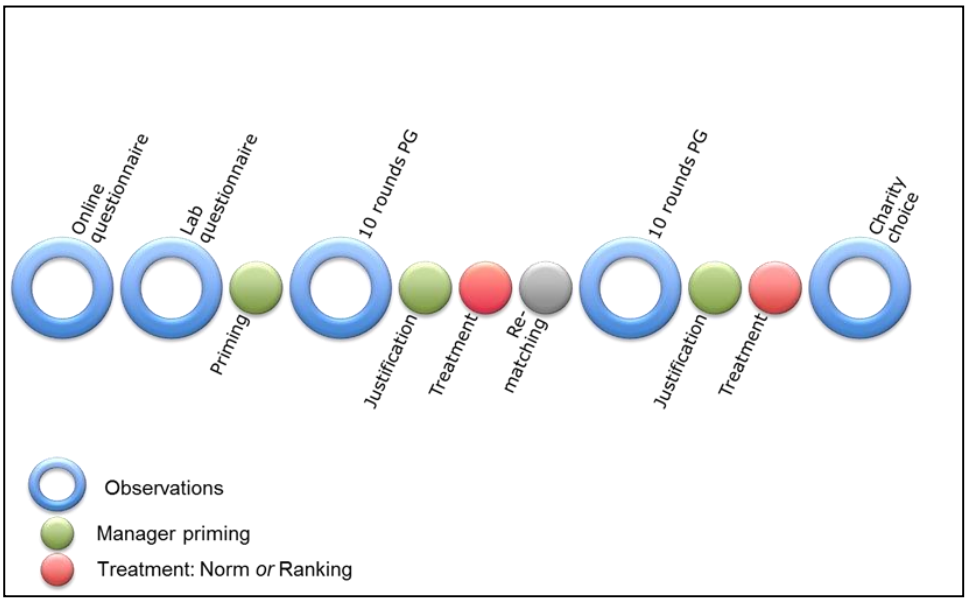


Figure B.3.3: Sequence of treatments in the "Public Goods experiments"

Hundred-and-fifty-six students at Utrecht University, the Netherlands, agreed to participate in the experiment. The age of the participants ranged from 19 to 32 with a mean of 21.4. The participants were all subscribed to an online data base and received invitation to the experiment by e-mail. Those willing to participate registered for an experimental session. The experiment had a 2 (Frame: individuals, managers) by 3 (Nudge: control, norm, commitment) between participants design. At the beginning of the experiment, all participants who were in the same condition were each seated in random order behind a computer. The instructions and materials needed were in front of them on their desk or were provided by the computer. The experimenter's only task was to make sure that the instructions were clear and that all participants would stick to the rules of the experiment. No further communication between the experimenter and the participants was necessary, except for the ranking in the two ranking treatments. Here the experimenter called out each group by their name and asked participants to put up the rank in front of them. Each of the six sessions lasted approximately 90 minutes. Each participant earned on average 15 Euros. The experiment was conducted using the software Z-tree (Fischbacher, 2007).

Hypotheses

Based on the literature study (see Appendices A.1. and A.5.1 and A.5.4) the following hypotheses can be formulated:

(1) Participants in the business-framed session ("managers") contribute higher amounts to the public good (presented to them as an environmental project) in comparison with the participants in the non-framed session ("individuals").
(2) Participants in the business-framed session ("managers") respond in a different way to nudges (such as norm and ranking) in comparison with the participants in the non-framed session ("individuals").
(3) Participants in the business-framed session ("managers") change their Behavior over the two rounds more than the participants in the non-framed session ("individuals").

Results

In order to determine the appropriate statistical tests for each of the hypotheses, the data should be first inspected for normality. If not mentioned explicitly, the used level of significance is 5%. The small sample size in each period in each session (24-28 participants) allowed us to perform the Shapiro-Wilk test for normality. While the null hypothesis of normality is accepted in some periods ($p>0.05$), it is rejected in other ($p<0.05$). Similar results were obtained when the skewness/kurtosis test was applied. Since the main dependent variable contribution is not normally distributed in more than one period in each of the six sessions, non-parametric tests were applied to test the hypotheses.

The first hypothesis that is tested is whether participants in the business-framed session ("managers") contribute higher amount to the public good (presented to them as an environmental project) in comparison with the participants in the non-framed session ("individuals"). A graphical illustration of the average contributions over 20 periods is presented in Figure B.3.4. While in the individual control treatment, the average contribution is higher than that of managers, in the next two sessions, in which the norm and ranking treatments are applied, managers contribute more to the public good than individuals. In order to test for the significance of these differences, a Wilcoxon rank-sum test (Mann-Whitney U test) is applied, which will show whether there is significant difference between median contribution of individuals and managers in each relevant treatment.

No significant difference in medians between individuals and managers is found over the 20 periods in the control treatment. However, when average contributions are inspected per round (over 10 periods), it becomes clear that in the second round there is significant difference at 10% significance level between population medians ($p=0.0984$). This difference may arise from the fact that business framed participants had to justify the decisions made in the first ten periods to the shareholders. In the norm treatment the same test is applied, with firstly testing whether there is significant difference in median contributions in each round and over two rounds. In both rounds managers contribute significantly more to the environmental project ($p=0.000$) than individuals do. However, in the last treatment, in which participants are ranked at the end of every sequence of ten periods, no significant difference is found between individuals and managers (the comparison is done both over 20 periods and after each round).

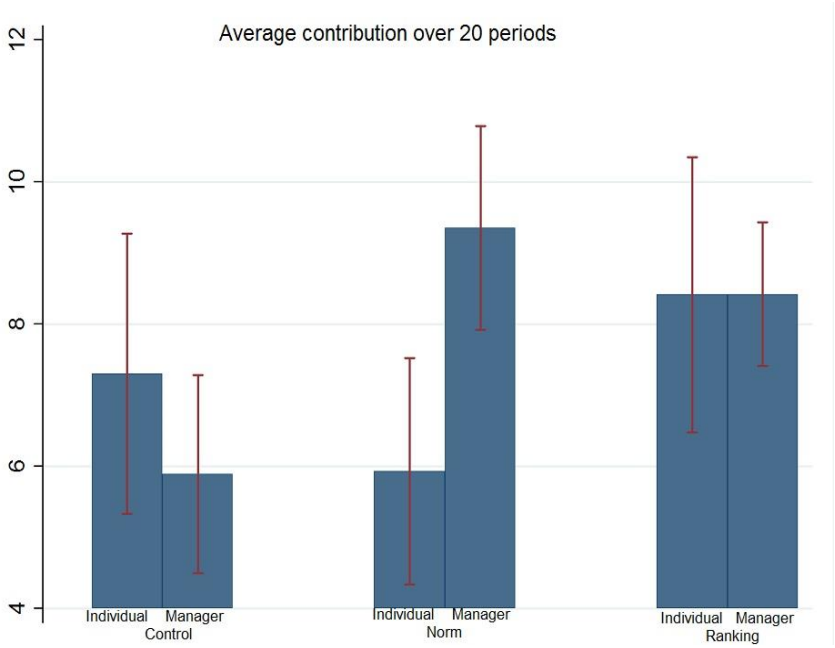


Figure B.3.4. Average contribution over 20 periods.

The test of the second hypothesis, that managers respond in a different way to nudges (such as norm and ranking) than individuals do, involves a comparison of the change in median contribution between norm and control treatment of individuals with the change in median contribution between norm and control treatment for managers. The same test is performed when ranking and control treatments are compared for individuals and managers, respectively. Finally, it is tested whether there is a change in the median of the average contribution over 20 rounds between ranking and norm treatments for individuals and managers separately. The Mann-Whitney U test shows that medians do not change significantly between the control and norm individual treatment (p=0.291). On the other hand, there is significant increase in managers' contributions to the public good in the norm treatment (p=0.0018). Furthermore, no significant change in contributions is found between control and ranking treatment for individuals (p=0.433), but again as in the norm treatment, such significant increase in contribution in the ranking treatment is present for managers (p=0.013). When the effect of the nudges is compared in the individuals and managers sessions, respectively, it is found that while individuals significantly increase their contributions in the ranking treatment (p=0.0484), compared with the norm treatment, there is no significant difference in median contributions over 20 periods across the same two treatments (norm and ranking) for managers (p=0.209).

With the aid of the Z-scores provided by the Mann-Whitney test, the effect size can be computed, following Fritz, Morris and Richler (2012). Applying their formula allows us to find and compare the effect of each treatment.[51] A value of r of 0.5 indicates a large

[51] In Fritz, Morris and Richler (2012) the effects size is calculated as: $r = \frac{z}{\sqrt{N}}$.

effect; a value of r of 0.3 shows that there is medium effect and a small effect is present when r is 0.1. A complete overview of the effect sizes is presented in Table B.3.1 If the Z-score of the Wilcoxon test is insignificant, then the effect size is considered to be zero. In the comparison of the average contribution over 20 periods between norm and ranking conditions for individuals the increase was significant from the norm to ranking condition and therefore the size of the effect is 0.27, with the negative sign in front signifying that the average contribution is lower in the norm than in the ranking treatment. A large effect (-0.42) is identified in the norm treatment for managers in comparison with the control treatment. The sign is again negative because the mean contribution in the control treatment is lower than that in the ranking treatment. In addition to this, a significant large effect (-0.43) is identified in the managers' norm treatment when the mean contributions are compared to those of individuals in the norm treatment. The increase in managers' contributions in the ranking treatment, compared to the control treatment is also significant and the effect is medium (-0.34).

	Z-score	**Effect size**
Individuals Control vs. Norm	1.056	0
Individuals Control vs. Ranking	-0.784	0
Individuals Norm vs. Ranking	-1.974**	-0.27; medium negative
Managers Control vs. Norm	-3.114***	-0.42; large negative
Managers Control vs. Ranking	-2.478**	-0.34; medium negative
Managers Norm vs. Ranking	1.258	0
Individuals C vs. Managers C	0.99	0
Individual N vs. Manager N	-3.246***	-0.43; large negative
Individual R vs. Manager R	0.021	0

*,**,*** indicate p<0.1, <0.05, <0.01

Table B.3.1. Effect sizes

The third hypothesis that is tested is whether managers change their Behavior over the two rounds more than individuals do. From Figure B.3.5. it can be seen that managers contribute more than individuals in both rounds in the norm treatment and in the first round of the ranking treatment, and less than individuals in the control and in the second round of the ranking treatment. The precise mean values are presented in Table B.3.2 below. Again, the Wilcoxon rank-sum test is applied to test whether there is a difference in population medians of average contribution (per participant) over the first ten periods (R1) and the average contribution per participant over the second 10 periods (R2).

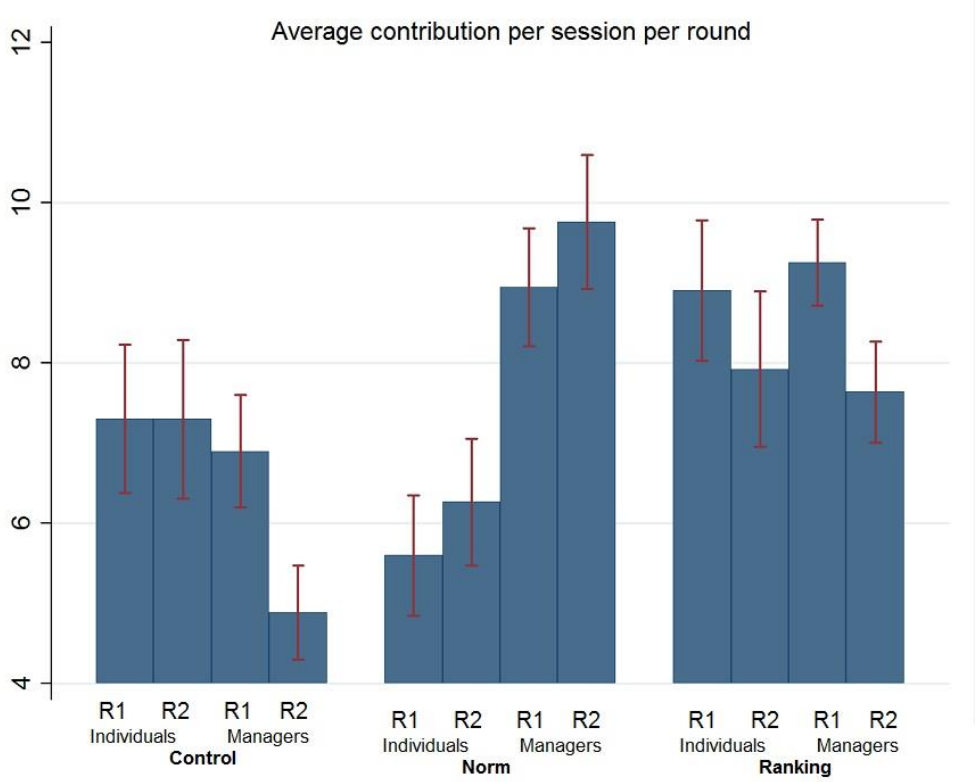


Figure B.3.5. Average contribution per session per round.

The Mann-Whitney test is applied in each session and differences between population medians are tested per round. In the individual control, norm and ranking treatment the null hypothesis is accepted and no difference is found between medians in the first and in the second round (p=0.9237, p=0.6226, and p=0.4035, respectively). In addition, no significant difference in contributions depending on the round is found for the manager control and manager norm treatments (p=0.1175 and p=0.7, respectively). However, in the manager ranking treatment, there is significant difference in distributions between the first and the second round (p=0.0412).

Since the median test is robust against outliers, the null hypothesis that the samples are drawn from populations with the same median will be tested in each session between rounds. In the individual control, norm and ranking treatments the null hypothesis is not rejected that the population medians in the first and in the second round in each session are equal (p=0.772, p=0.423, p=0.386). While the null hypothesis is also not rejected for the managers norm treatment (p=0.789), significant difference (at 10% significance level) in medians between rounds is found in the business-framed control and ranking treatments (p=0.061 and p=0.083). A summary of the three hypothesis and the obtained results is presented in Table B.3.2 and Table B.3.3.

Session/Contribution	**Round 1**[1]	**Round 2**[1]
Individual Control (VCM 1)	7.30	7.30
Individual Norm (VCM 2)	5.60	6.27
Individual Ranking (VCM 3)	8.90	7.93
Manager Control (VCM 4)	6.90^{+}	4.88^{+}
Manager Norm (VCM 5)	8.95	9.76
Manager Ranking (VCM 6)	9.25**,$^{+}$	7.64**,$^{+}$

*,**,*** indicate p<0.1, <0.05, <0.01 for Wilcoxon rank-sum test and $^{+,++,+++}$ indicate p<0.1, <0.05, <0.01 for median test . 1. Wilcoxon rank-sum and median tests comparing the difference in contributions between rounds for each session.

Table B.3.2. Summary of the results obtained from Wilcoxon rank-sum test and median test

Contribution over 2 rounds						
Session/Contribution	Control[1]	Norm[1]	Ranking[1]	Control-Norm[2]	Control-Ranking[2]	Norm-Ranking[2]
Individual treatment	7.30	5.93***	8.41	1.43	-1.11	-2.48**
Manager treatment	5.89	9.35***	8.44	-3.46***	-2.55**	0.91

*,**,*** indicate p<0.1, <0.05, <0.01. 1.Wilcoxon rank-sum test comparing the difference in contributions over 2 rounds between each pair of treatments (VCM 1 to VCM 4, VCM 2 to VCM 5, VCM 3 to VCM 6). 2. Wilcoxon rank-sum test comparing difference in differences in contributions in each session, depending on the framing.

Table B.3.3. Summary of the results for contribution over 2 rounds

Finally, two robust regressions are run (one for control and norm treatments and one for control and ranking treatments) in order to see whether the estimated results are robust to changes in model specification, such that the inferences that have been made about the tested hypotheses or predictions do not change (Plümper & Neumayer, 2012). The main dependent variable is the average contribution over ten periods in round 2. A dummy that indicates a difference between managers and individuals is introduced as well as three dummies for the three types of treatments (control, norm and ranking). The inclusion of interaction terms (between managers and norm and managers and ranking) allows us to see whether the effect of the treatment is different for the two groups (managers and individuals). In the first robust regression it is tested whether there is a difference in contributions depending on the type of treatment (control and norm) and the framing (individuals and managers). Two F-tests are performed, one that tests the significance of the treatment, and another one for the significance of the framing. Both tests show that there is statistically significant difference between the norm and control treatments (for managers and individuals, p=0.0004) and framed and non-framed treatments (for norm and control treatments, p=0.017). This result is in harmony with the one obtained with the Mann-Whitney test. The second robust regression is similar to the first one with the only difference being that instead of the norm treatment, the ranking treatment is compared to the control treatment, and differences that arise from framing are compared. While the first F-test shows that the effect of framing is not significantly different for the ranking and control treatments (p=0.23), the second one reveals a significant difference (at 10% significance level) of the type of treatment (ranking) for individuals and managers

(p=0.096). The results of the two F-tests are the same as those of the Mann-Whitney tests performed earlier.

Next we analyse the effect of the feedback in Round 1 on the Behavior in round 2. Table B.3.4 show the change in contribution in the second round after feedback on the relation of own contribution to the norm at the end of the first round. It seems that the injunctive norm ensured that those participants who contributed more than 50% more than the norm did not reduce their contributions in the next round. However, the participants who contributed less than the social norm did decrease their contribution even further.

Average contribution in Round 2			
Feedback on deviation from Norm	**increase**	**same**	**decrease**
50% or more above	7	-	1
above but less than 50%	10	-	7
below but less than 50%	7	1	13
50% or more below	1	4	5

Table B.3.4. Change in contribution in second round after feedback on norm in first round

Table B.3.5 show the change in contribution in the second round after feedback on the ranking w.r.t own contribution in the group at the end of the first round.

Average contribution in Round 2			
Rank in Round 1	**increase**	**same**	**decrease**
1	5	-	8
2	3	-	8
3	3	-	10
4	4	1	6

Table B.3.5. Change in contribution in second round after feedback on rank in first round

A Kruskal-Wallis test confirms that the norm feedback led to significantly ($p = 0.0304$ different response, while for the ranking feedback this test does not confirm significantly different responses (change in contribution). A simple linear regression in Table X shows that the ranking in round 1 has a weakly significant negative effect on the change in the contribution, while the deviation is positively associated with changes in the contribution.

Finally we included two measures on the subject level: the individual scores on the Machiavelli scale and on the Social value orientation (SVO) scale. The two samples

índividuals'and 'managers' do not differ statistically with respect to the scores on the Machiavelli scale, (Prob > |z| = 0.7787). Social value orientation (SVO) is significantly higher in the sample of "individuals". There are no significant interaction effects between these two variables and the treatment variables.

Change in contribution	Ranking treatment	Norm treatment
Rank in Round 1	-1.065*	
	(-1.81)	
Percentage Round 1		0.031***
		(2.720)
Manager	1.379	-0.4466
	(1.080)	(-0.33)
Age	0.151	-0.0029
	(1.190)	(-0.02)
SVO	7.832	13.6093
	(0.730)	(1.250)
Machiavelli	0.056	0.0159
	(0.840)	(0.320)
Constant	-5.958	-3.1018
	(-1.150)	(-0.490)
Number of obs	41	48
Test statistics	F(5, 35) =1.49	F(5, 42) =1.89
Prob > F	0.2196	0.1166
R-square	0.174	0.1706
Root MSE	3.9319	4.5026

t-values in parenthesis, *,**,*** indicate p<0.1, <0.05, <0.01.

Table C.3.6. Linear regression on the change in contribution in second round after feedback on rank and norm in first round

Table B.3.7 presents an OLS regression of the relation between a participant's score on the Machiavelli scale and this participant's contribution. This analysis reveals that participants in the 'managers' sessions who score higher on the Machiavelli scale contribute significantly less to the public good. This result indicates that we were able to achieve the desired effect by our priming: participants in the 'managers' sessions who have an attitude described as 'the end justifies all means' behave more selfishly.

Contribution	Managers	Individuals
Norm	3.0711***	-1.146
	(3.31)	(-0.87)
Ranking	2.067**	1.355
	(2.22)	(0.93)
Machiavelli	-0.112**	-0.0455
	(-3.04)	(-0.85)
Age	0.127	0.151
	(1.07)	(1.32)
Friends	0.219	-0.5838
	(0.36)	(-1.16)
gender	0.959	0.1794
	(1.17)	(0.89)
_cons	12.746***	8.9078
	(3.39)	(1.67)
Period Dummies	yes***	yes***
Number of obs	1380	1340
Test statistics	F(17, 68) =15.17	F(16, 66)=6.20
Prob > F	0.000	0.000
R-squared	0.2086	0.1545
Root MSE	5.2703	6.6101

t-values in parenthesis, *,**,*** indicate p<0.1, <0.05, <0.01.

Table B.3.7. Comparison on contribution in the two samples.

Discussion

The findings of this research support the first hypothesis that some forms of non-monetary incentives have higher impact on managers' regard for collective interests than on individuals. The specific type of non-monetary incentive that has higher influence on managers and makes them contribute more to the public good is social norm. When social norm is present and managers are informed whether their contribution is below or above the average, this is reflected in their investments in the second round. A possible explanation of the significant increase of managers' contribution in comparison with individuals as a result of the presence of this nudge could be that social norms constitute a substantial part of the institutional framework, of which each organization is part, and as a result powerful individuals have to conform to them. Therefore, if there is an established norm in the society, the manager has to fulfil the expectations of the

stakeholders. This change in Behavior of managers in comparison with individuals also indicates that pro-social tendencies (which represent the investment in the environmental project) have been made salient in this treatment to induce managers to consider collective interests in addition to their own interests. Therefore, in this hypothesis the finding of Piff et al. (2011) is confirmed that individuals with high power will exhibit more pro-social Behavior than individuals with low power when such tendencies are present.

However, another hypothesis that was not confirmed was that visibility and reputation (which was represented by ranking in the experiments), for which managers are also concerned and is part of their hierarchical position, have no different effect on them than on individuals who do not experience this higher visibility both in and outside the organization. The reason for this could be that image motivation (Ariely et al., 2009) is something about both individuals and managers are concerned. As a result of the fact that both types of individuals are equally affected by image utility, no significant differences between these two sessions have been identified. Thus, granting individuals with power does not lead to higher contributions than if individuals without such power make decisions about their investments when no nudges are present, even if there is higher visibility of group members. This finding could complement the theory about managerial reputation in the organization. Since managers and individuals do not differ significantly in their contributions, it cannot be concluded that individuals with power aim at achieving more power and maintaining the reputation and image they have more than individuals with low power.

Another main finding is that managers respond in a different way to nudges than individuals. In both cases when the control group is compared to the respective treatment (norm or ranking) managers did change their Behavior and increased their contributions in comparison with the control group significantly more than individuals did. This result may be due to the fact that the combination of nudges and business framing increases the responsibility of managers. When these nudges are present managers' concern for collective interests increases and they consider to a greater extent stakeholder claims than when such nudges are not present. While stewardship theory alone does not hold (managers' contribution is the same as that of individuals in the control group), when this business framing is combined with nudges, there is significant increase in contributions. However, while there is significant increase in these treatments in comparison with the control group for managers, the difference between the nudges in question is not significant. On the other hand, individuals respond differently to norms and ranking. Again, this confirms the image utility theory (Ariely et al., 2009) and implies that individuals care more about their image in the society than what the social norms posit to be right.

The final test shows that managers and individuals do not change significantly their contributions over the two rounds in the control and the norm treatment. However, while managers change their Behavior after ranking in the second round and after they know that their increased visibility will affect their reputation, no such difference is found between the first round and the second round for individuals. Thus, the impact of ranking

is more salient for individuals in the comparison between rounds. Therefore, the reputation that managers may gain as a result of their pro-social Behavior and the additional power that they may be granted, has an effect on their contributions, although they are lower than in the first round. This finding is also in harmony with the theoretical predictions about reputation concerns and visibility in organization.

With the results obtained from this study it becomes clear that the fact that managers have more power than individuals and act in a different framework will affect their decisions regarding pro-social Behavior. However, these results relate to present Behavior only. Future research may take these results as a starting point and include the intergenerational interests. Intergenerational dilemmas have two main dimensions – inter-temporal and interpersonal – which are in a constant interaction (Wade-Benzoni & Tost, 2009). These dilemmas arise because of the conflict that exists between satisfying self-interest in the present while taking into account the interests of future generations. The inter-temporal dimension relates to problems that arise due to the fact that decisions that individuals take now have consequences in the future. Related to this is the interpersonal dimension, whose main idea is that Behavior of individuals has an impact of other people as well. One of the main characteristics of these intergenerational dilemmas relates to the distribution of power between the generations. When the current generation is fully responsible for the allocation of limited resources, then it has complete decision-making power and future generations cannot voice their concerns and are hence powerless (Wade-Benzoni et al., 2008). In addition to this power asymmetry, there is absence of generation-to-generation interaction and direct reciprocity between generations. However, similar to the stewardship concerns that managers in an organization may have, Wade-Benzoni et al. (2008) suggest that the complete power that current generations possess and the uncertainty about the future outcomes of current decisions may lead them to express responsibility and stewardship concerns for the welfare of future generations. Using the same procedure with priming, Tost et al. (2008) found that high-power individuals considered higher allocations to future generations to be fair than those who were not primed. Wade-Benzoni et al. (2008) explain these higher offers with the fact that the uncertainty about future consequences gives people the feeling of power. As a result, they recognize that they are responsible for powerless future generations and they focus their attention more on the outcomes of their decisions. What can be tested in future studies is whether these stewardship concerns are triggered in managers and individuals and whether the difference between both groups is significant.

B.4: Experiment Instructions

Instructions Legacy Experiment
- Instructions
- Neutral (Control) - Positive – Negative Prime
- Charity Text Future Other
- Charity Text Present Other

Instructions Commitment and Social Preferences
- Control Treatment - Commitment Treatment

Instructions Individual Public Good Game
- Control Treatment - Norm Treatment - Ranking Treatment

Instructions Managers Public Good Game
- Control Treatment – Norm Treatment – Ranking Treatment
- Text Manager Priming

Charity Information Text Public Good Games

Instructions Legacy Experiments

Experimental Laboratory for Sociology and Economics Universiteit Utrecht

- Instructions for Experiment 5 -

Thank you very much for participating in this experiment. Please read the following instructions carefully. These instructions state everything you need to know in order to participate in the experiment. If you have any questions, please raise your hand. One of the experimenters will approach you in order to answer your question. The rules are equal for all the participants.

The instructions which we have distributed to you are solely for your private information. It is prohibited to communicate with the other participants during the experiment. Turn off your mobile phone and put it in your bag. Also, you may only use the functions on the screen that are necessary for the functioning of the experiment. If you happen to violate one of these rules, you will be excluded from the experiment and from all payments.

This experiment will take about 45-60 minutes in total. After you completed all the required tasks, you will be awarded 12 Euro by the experimenter for your efforts.

- Overview of the experiment -

The experiment consists of three parts. For the *first part* you are asked to fill in a short questionnaire on the computer. Please take your time to fill in this questionnaire accurately. After you answered the questionnaire, the second part of the experiment will start.

The *second part* of the experiment is divided into two tasks. First, you will be asked to read a newspaper article which is provided with these instructions. Then you will be asked to do a short related task.

The *third part* of the experiment consists of a short decision-making task on the computer.

At the end you will be asked to fill in another brief questionnaire. In the meantime your earnings will be prepared. We would like you to remain seated until the experimenter signals that you can leave.

- Detailed information on the second part of the experiment -

For the second part, please read the news story that has been provided together with the instructions. After you finish reading the story, you will be asked to do 2 tasks.
First, describe how you would characterize the author's writing style.
Second, what changes could be made to the text to clarify the description of the incident?
Write down your answers on the provided answer sheet under 'A' and 'B' respectively.
(If you need more space, you can continue writing on the reverse side of the page.)

- Detailed information on the third part of the experiment -

In this third part of the experiment you will be asked to make decisions. In these instructions we will explain which options you will face. These options will appear on the screen of your computer. You will be asked to make a choice for one of the options.

This decision-making game has two players: person A and person B. (For a graphical representation see figure 1 on the next page.)

Possible moves are:
Person A moves first and has two choices:
1) Left
2) Right

If person A decides to play Right person B can do nothing and the game ends.

If person A decides to play Left person B will have the following two choices:
1) Left
2) Right

After person B made his/her decision the game ends.

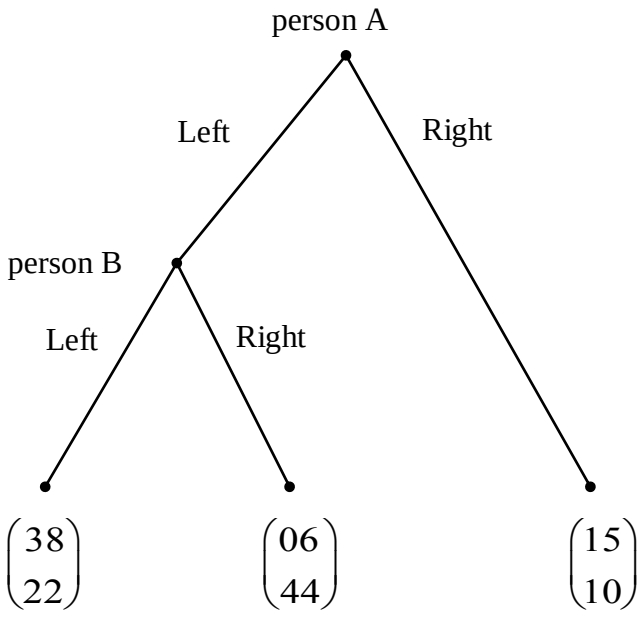
This game will be played in the following way:
Imagine you will first play the role of person A. What decision would you make in this situation. Next, suppose you will be person B under the assumption that person A did choose Left. How would you decide in this case? In sum, you are asked twice to make a hypothetical decision between Left and Right once in the role of person A and once in the role of person B.
Please indicate your decision on the computer.

In order to enable you to make your decisions, table 1 provides a detailed overview of the structure of the hypothetical payoff consequences of the decisions (see also the game tree in figure 1). Please note: all payoffs are hypothetical, and given in the table and figure below.

Assume you are assigned the role of person A	**Payoffs:**
You chose Right	You receive 15 points and person B receives 10 points
You chose Left and person B chose also Left	You receive 38 points and person B receives 22 points
You chose Left and person B chose Right	You receive 6 and person B receives 44 points
Assume you are assigned the role of person B	**Payoffs:**
Person A chose Right	You receive 10 points and person A receives 15 points
Person A chose Left and you chose also Left	You receive 22 points and person A receives 38 points
Person A chose Left and you chose Right	You receive 44 and person A receives 6 points

Table 1: Payoff structure.

Figure 1: The game tree.



Payoffs:
The upper number is person A's hypothetical payoff.
The lower number is person B's hypothetical payoff.

Questionnaire

After the third part you will be asked to fill in another short questionnaire. In the meantime your earnings will be prepared. Please remain seated until the payment has taken place and the experimenter tells you to leave.

Neutral Legacy Text

HAS RUSSIAN MATH WHIZ SOLVED $1M PUZZLE?

A reclusive Russian mathematician may have solved one of the world's toughest mathematics problems and stands to win $1 million -- but he doesn't appear to care. Grigori Perelman from St. Petersburg claims to have solved the extremely complicated Poincare Conjecture that tries to explain the Behavior of multi-dimensional shapes in space, thereby making himself eligible for the prize offered by the Massachusetts-based Clay Mathematics Institute. But there's a snag. He has simply posted his results on the Internet and left his peers to work out for themselves whether he is right -- something they are still struggling to do. "There is good reason to believe that Perelman's approach is correct. But the trouble is, he won't talk to anybody about it and has shown no interest in the money," said Keith Devlin, Professor of Mathematics at Stanford University in California. "There won't be a golden moment when he is suddenly accepted as being right. There will just be a drift in that direction," he told the annual meeting of the British Association for the Advancement of Science.

Negative Legacy Text

PERSON KILLED IN AIRCRAFT BRAKE FAILURE ACCIDENT

The privately-owned L39 jet failed to stop on the runway at Duxford, in Cambridgeshire, on Sunday and careened on to the normally busy M11 motorway, local police said. A spokeswoman for Cambridgeshire ambulance service said: "We sent two ambulances and two medics, and Essex assisted with air ambulance. One patient was deceased at the scene." The deceased was a passenger on the plane who was burned to death when the plane caught fire shortly after impact with the runway. As far as she was aware, there were no other passengers in the plane. The jet managed to avoid hitting any cars before coming to a stop in the central reservation, straddling both carriageways. A spokeswoman for Duxford Airfield said that the Air Accidents Investigation Branch was looking into the cause of the accident. It is the second freak aerial accident in two days in southern England: Two people were killed when a skydiver crashed through the wing of a glider near Hinton Airfield on Saturday. In that incident, the skydiver survived, however the glider fell from 5,000 feet to hit two innocent pedestrians walking along a popular road.

Positive Legacy Text

LEXINGTON CELEBRATES BIRTHDAY LOCAL HERO

Several dozens of people gathered at Emery Park last Friday to celebrate the 75th birthday of local hero and community man Richard Harper. Harper decided to devote his live to the community of Lexington after he saved the then 5-year old Maura Corr from drowning in 1962. Since then, he founded the Evergreen Association to create more parks in town, and made it to the interstate finals as a trainer/coach of the local boys' soccer team, Lexington Rangers. A few years ago, he started up a conservation initiative to

separate trash. His fellow townsmen at the park praise his efforts for the well-being of the community. “Parker’s time at the Rangers has taught our boys that sport is both fun and rewarding”, says soccer fan Mike Willow. “He is such a devoted man”, says Evergreen Association’s current chair, Tommy Wilkins, “his love parks have made our town one of the best places to live in all of America”, referring to Lexington’s 2012 nomination for ‘Best Town of America’. Harper himself is sitting happily amidst the crowd, knowing that Lexington will continue to build on his legacy to become one of the most pleasant and beautiful places in the country.

Charity Text Future Other

Utrecht University has recently started to encourage pro-environmental Behavior and the support of a charitable organization called SolarAid to which you could donate a part of/all of your earnings. Below is a description of this organization. In case you would wish to make a donation please indicate the amount and leave this together with the flyer in the envelope on your desk.

SolarAid is an organization that aims to relieve poverty in the sub-Sahara through facilitating the provision of solar energy to those who have poor outlook for their lives. It is a small charity with a big impact: the average household size in east Africa is five persons, so with more than 450,000 solar lights sold since 2012, their work has helped transform the lives of over two million people already. Solar energy can help people to power lamps and do away with expensive kerosene lamps. Families spend about 20% of their income on fuel for these lamps that emit a dangerous and poisonous smoke. Using solar-powered lamps means that people have significantly more money left for investing in their own, their families' and their children's future, that is, to spend on education and better food to improve their long-run nutrition. Thereby, they are able to provide a better future for new generations.

I donate the following amount of money out of my experimental earnings (please insert either amounts of full Euros or rounded to 50 cents):

_____

Charity Text Present Other

Utrecht University has recently started to encourage pro-environmental Behavior and the support of a charitable organization called SolarAid to which you could donate a part of/all of your earnings. Below is a description of this organization. In case you would wish to make a donation please indicate the amount and leave this together with the flyer in the envelope on your desk.

SolarAid is an organization that aims to relieve poverty in the sub-Sahara through facilitating the provision of solar energy to those who are in immediate need. It is a small charity with a big impact: the average household size in east Africa is five persons, so with more than 450,000 solar lights sold since 2012, their work has helped transform the lives of over two million people already. Solar energy can help people to power lamps and do away with expensive kerosene lamps. Families spend about 20% of their income on fuel for these lamps that emit a dangerous and poisonous smoke. Using solar-powered lamps means that people have significantly more money left for their immediate needs, that is, to buy the necessities of life such as food and clean water and relief their current state of poverty.

I donate the following amount of money out of my experimental earnings (please insert either amounts of full Euros or rounded to 50 cents):

_____

Instructions Commitment and Social Preferences

- Instructions -

Please read the following instructions carefully. These instructions state everything you need to know in order to participate in the experiment. If you have any questions, please raise your hand. One of the experimenters will approach you in order to answer your question. The rules are equal for all the participants.

The instructions which we have distributed to you are solely for your private information. It is prohibited to communicate with the other participants during the experiment. Turn off your mobile phone and put it in your bag. Also, you may only use the functions on the screen that are necessary for the functioning of the experiment. Thank you very much. If you violate this rule, we shall have to exclude you from the experiment and from all payments. Should you have any questions please ask us

- Overview of the experiment -

The experiment consists of two parts. For the *first part* you are asked to answer a short questionnaire. Please take your time to fill in this questionnaire accurately. After every participant answered the questionnaire, the second part of the experiment will start.

The *second part* of the experiment is divided into different decision screens. In total, the second part of experiment consists of eight decision screens, seven of which are presenting a sequence of decisions.

The following pages describe the course of the second part of the experiment in detail:

- Detailed information on the second part of the experiment -

On the first decision screen you are asked to answer a short question. [This screen was added only in the commitment treatment.]

For the next three decision screens you are asked to choose between smaller payments closer to today and larger payments further in the future. For each row, choose **one** payment: either the smaller, sooner payment or the later, larger payment.

For the second set of three decision screens you are asked to choose between fixed payments closer to today and the same payments plus a payment that we transfer to a charity further in the future. If you decide for a payment in the future that involves a

transfer to the charity, we will transfer the specified money at the specified date to a charity of your choice. More information on the charities is provided on the separate information sheet. For each row, choose **one** payment: either the sooner payment without a payment to charity or the later payment with a payment to charity

For the last decision screen you are asked to choose between fixed payments today and a smaller payment today plus a payment that we transfer to a charity today. If you decide for the smaller payment plus a payment to the charity, we will transfer the specified money today to the charity of your choice.

For participating in the experiment, you get a minimum amount of *€12.00* for yourself to start with. Now we ask you to determine when you will receive this amount, with the payment increasing if you choose to receive it later in time in the *first three decisions* **or** with a payment to the charity of your choice if you choose to receive your payment later in the *second set of three decisions*, or if you choose a smaller payment today in the *last set of decisions*. You will make your decisions in seven blocks:

A BLOCK (Numbers 1 through 20):
Decide between payment today and payment in one month (*10th of July 2013)*

1. Receive €12.00 *today* or receive €12.05 *in one month*.
2. Receive €12.00 *today* or receive €12.10 *in one month*.
3. Receive €12.00 *today* or receive €12.15 *in one month*.
4. Receive €12.00 *today* or receive €12.20 *in one month*.
5. Receive €12.00 *today* or receive €12.25 *in one month*.
6. Receive €12.00 *today* or receive €12.30 *in one month*.
7. Receive €12.00 *today* or receive €12.35 *in one month*.
8. Receive €12.00 *today* or receive €12.40 *in one month*.
9. Receive €12.00 *today* or receive €12.45 *in one month*.
10. Receive €12.00 *today* or receive €12.50 *in one month*.
11. Receive €12.00 *today* or receive €12.55 *in one month*.
12. Receive €12.00 *today* or receive €12.60 *in one month*.
13. Receive €12.00 *today* or receive €12.65 *in one month*.
14. Receive €12.00 *today* or receive €12.70 *in one month*.
15. Receive €12.00 *today* or receive €12.75 *in one month*.
16. Receive €12.00 *today* or receive €12.80 *in one month*.
17. Receive €12.00 *today* or receive €12.85 *in one month*.
18. Receive €12.00 *today* or receive €12.90 *in one month*.
19. Receive €12.00 *today* or receive €12.95 *in one month*.
20. Receive €12.00 *today* or receive €13.00 *in one month*.

B BLOCK (Numbers 21 through 40):
Decide between payment today and payment in six months (*10th of December 2013)*

21. Receive €12.00 *today* or receive €12.30 *in six months*.
22. Receive €12.00 *today* or receive €12.60 *in six months*.
23. Receive €12.00 *today* or receive €12.90 *in six months*.
24. Receive €12.00 *today* or receive €13.20 *in six months*.

25. Receive €12.00 *today* or receive €13.50 *in six months*.
26. Receive €12.00 *today* or receive €13.80 *in six months*.
27. Receive €12.00 *today* or receive €14.10 *in six months*.
28. Receive €12.00 *today* or receive €14.40 *in six months*.
29. Receive €12.00 *today* or receive €14.70 *in six months*.
30. Receive €12.00 *today* or receive €15.00 *in six months*.
31. Receive €12.00 *today* or receive €15.30 *in six months*.
32. Receive €12.00 *today* or receive €15.60 *in six months*.
33. Receive €12.00 *today* or receive €15.90 *in six months*.
34. Receive €12.00 *today* or receive €16.20 *in six months*.
35. Receive €12.00 *today* or receive €16.50 *in six months*.
36. Receive €12.00 *today* or receive €16.80 *in six months*.
37. Receive €12.00 *today* or receive €17.10 *in six months*.
38. Receive €12.00 *today* or receive €17.40 *in six months*.
39. Receive €12.00 *today* or receive €17.70 *in six months*.
40. Receive €12.00 *today* or receive €18.00 *in six months*.

C BLOCK (Numbers 41 through 60):
Decide between payment in six months (10th of December 2013) and payment in seven months (10*th of January 2014)*

41. Receive €12.00 *in six months* or receive €12.05 *in seven months*.
42. Receive €12.00 *in six months* or receive €12.10 *in seven months*.
43. Receive €12.00 *in six months* or receive €12.15 *in seven months*.
44. Receive €12.00 *in six months* or receive €12.20 *in seven months*.
45. Receive €12.00 *in six months* or receive €12.25 *in seven months*.
46. Receive €12.00 *in six months* or receive €12.30 *in seven months*.
47. Receive €12.00 *in six months* or receive €12.35 *in seven months*.
48. Receive €12.00 *in six months* or receive €12.40 *in seven months*.
49. Receive €12.00 *in six months* or receive €12.45 *in seven months*.
50. Receive €12.00 *in six months* or receive €12.50 *in seven months*.
51. Receive €12.00 *in six months* or receive €12.55 *in seven months*.
52. Receive €12.00 *in six months* or receive €12.60 *in seven months*.
53. Receive €12.00 *in six months* or receive €12.65 *in seven months*.
54. Receive €12.00 *in six months* or receive €12.70 *in seven months*.
55. Receive €12.00 *in six months* or receive €12.75 *in seven months*.
56. Receive €12.00 *in six months* or receive €12.80 *in seven months*.
57. Receive €12.00 *in six months* or receive €12.85 *in seven months*.
58. Receive €12.00 *in six months* or receive €12.90 *in seven months*.
59. Receive €12.00 *in six months* or receive €12.95 *in seven months*.
60. Receive €12.00 *in six months* or receive €13.00 *in seven months*.

Example 1:
If you get number (3): Would you like to receive €12.00 today or €12.15 in one month

If you prefer €12.00 today in Question 3, mark as follows:
● Receive €12.00 today or receive ○ €12.15 in one month.
If you prefer €12.15 in one month in Question 3, mark as follows:
○ Receive €12.00 today or receive ● €12.15 in one month.

D BLOCK (Numbers 61 through 80):
Decide between payment today and payment in one month (10th of July 2013)

61. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.05* going to the charity of your choice
62. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.10* going to the charity of your choice.
63. Receive €12.00 *today* or receive €12.00 *in one month, plus* €0.15 going to the charity of your choice.
64. Receive €12.00*today* or receive €12.00 *in one month, plus €0.20* going to the charity of your choice.
65. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.25* going to the charity of your choice.
66. Receive €12.00 *today* or receive €12.00 *in one month, plus* €0.30 going to the charity of your choice.
67. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.35* going to the charity of your choice.
68. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.40* going to the charity of your choice.
69. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.45* going to the charity of your choice.
70. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.50* going to the charity of your choice.
71. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.55* going to the charity of your choice.
72. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.60* going to the charity of your choice.
73. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.65* going to the charity of your choice.
74. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.70* going to the charity of your choice.
75. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.75* going to the charity of your choice.
76. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.80* going to the charity of your choice.
77. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.85* going to the charity of your choice.
78. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.90* going to the charity of your choice.

79. Receive €12.00 *today* or receive €12.00 *in one month, plus €0.95* going to the charity of your choice.
80. Receive €12.00 *today* or receive €12.00 *in one month, plus €1.00* going to the charity of your choice.

E BLOCK (Numbers 81 through 100):
Decide between payment today and payment in six months (10th of December 2013)

81. Receive €12.00 *today* or receive €12.00 *in six months, plus €0.30* going to the charity of your choice
82. Receive €12.00 *today* or receive €12.00 *in six months, plus €0.60* going to the charity of your choice.
83. Receive €12.00 *today* or receive €12.00 *in six months, plus* €0.90 going to the charity of your choice.
84. Receive €12.00*today* or receive €12.00 *in six months, plus €1.20* going to the charity of your choice.
85. Receive €12.00 *today* or receive €12.00 *in six months, plus €1.50* going to the charity of your choice.
86. Receive €12.00 *today* or receive €12.00 *in six months, plus €1.80* going to the charity of your choice.
87. Receive €12.00 *today* or receive €12.00 *in six months, plus €2.10* going to the charity of your choice.
88. Receive €12.00 *today* or receive €12.00 *in six months, plus €2.40* going to the charity of your choice.
89. Receive €12.00 *today* or receive €12.00 *in six months, plus €2.70* going to the charity of your choice.
90. Receive €12.00 *today* or receive €12.00 *in six months, plus €3.00* going to the charity of your choice.
91. Receive €12.00 *today* or receive €12.00 *in six months, plus €3.30* going to the charity of your choice.
92. Receive €12.00 *today* or receive €12.00 *in six months, plus €3.60* going to the charity of your choice.
93. Receive €12.00 *today* or receive €12.00 *in six months, plus €3.90* going to the charity of your choice.
94. Receive €12.00 *today* or receive €12.00 *in six months, plus €4.20* going to the charity of your choice.
95. Receive €12.00 *today* or receive €12.00 *in six months, plus €4.50* going to the charity of your choice.
96. Receive €12.00 *today* or receive €12.00 *in six months, plus €4.80* going to the charity of your choice.
97. Receive €12.00 *today* or receive €12.00 *in six months, plus €5.10* going to the charity of your choice.
98. Receive €12.00 *today* or receive €12.00 *in six months, plus €5.40* going to the charity of your choice.
99. Receive €12.00 *today* or receive €12.00 *in six months, plus €5.70* going to the charity of your choice.

100. Receive €12.00 *today* or receive €12.00 *in six months, plus €6.00* going to the charity of your choice.

F BLOCK (Numbers 101 through 120):

Decide between payment in six months (*10th of December 2013)* and payment in seven months (*10th of January 2014)*

101. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.05* going to the charity of your choice.
102. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.10* going to the charity of your choice.
103. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.15* going to the charity of your choice.
104. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.20* going to the charity of your choice.
105. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.25* going to the charity of your choice.
106. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.30* going to the charity of your choice.
107. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.35* going to the charity of your choice.
108. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.40* going to the charity of your choice.
109. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.45* going to the charity of your choice.
110. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.50* going to the charity of your choice.
111. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.55* going to the charity of your choice.
112. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.60* going to the charity of your choice.
113. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.65* going to the charity of your choice.
114. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.70* going to the charity of your choice.
115. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.75* going to the charity of your choice.
116. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.80* going to the charity of your choice.
117. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.85* going to the charity of your choice.
118. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.90* going to the charity of your choice.
119. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €0.95* going to the charity of your choice.
120. Receive €12.00 *in six months* or receive €12.00 *in seven months, plus €1.00* going to the charity of your choice.

G BLOCK (Numbers 121 through 140):
Decide between payment today and payment to a charity of your choice today

121. Receive €12.00 *today* or receive €12.00 *today.*
122. Receive €12.00 *today* or receive €11.40 *today, plus €0.60* going to the charity of your choice.
123. Receive €12.00 *today* or receive €10.80 *today, plus €1.20* going to the charity of your choice.
124. Receive €12.00 *today* or receive €10.20 *today, plus* €1.*80* going to the charity of your choice.
125. Receive €12.00 *today* or receive €9.60 *today, plus €2.40* going to the charity of your choice.
126. Receive €12.00 *today* or receive €9.00 *today, plus €3.00* going to the charity of your choice.
127. Receive €12.00 *today* or receive €8.40 *today, plus €3.60* going to the charity of your choice.
128. Receive €12.00 *today* or receive €7.80 *today, plus €4.20* going to the charity of your choice.
129. Receive €12.00 *today* or receive €7.20 *today, plus* €4.*80* going to the charity of your choice.
130. Receive €12.00 *today* or receive €6.60 *today, plus* €5.40 going to the charity of your choice.
131. Receive €12.00 *today* or receive €6.00 *today, plus* €6.00 going to the charity of your choice.
132. Receive €12.00 *today* or receive €5.40 *today, plus* €6.60 going to the charity of your choice.
133. Receive €12.00 *today* or receive €4.80 *today, plus* €7.20 going to the charity of your choice.
134. Receive €12.00 *today* or receive €4.20 *today, plus* €7.80 going to the charity of your choice.
135. Receive €12.00 *today* or receive €3.60 *today, plus* €8.40 going to the charity of your choice.
136. Receive €12.00 *today* or receive €3.00 *today, plus* €9.00 going to the charity of your choice.
137. Receive €12.00 *today* or receive €2.40 *today, plus* €9.60 going to the charity of your choice.
138. Receive €12.00 *today* or receive €1.80 *today, plus* €10.20 going to the charity of your choice.
139. Receive €12.00 *today* or receive €1.20 *today, plus* €10.80 going to the charity of your choice.
140. Receive €12.00 *today* or receive €0.60 *today, plus* €11.40 going to the charity of your choice.

Example 2:
If you get number (76): Would you like to receive €12.00 today or €12.00 in one month, plus €0.80 going to the charity of your choice.

If you prefer €12.00 today in Question 76, mark as follows:
● Receive €12.00 today or receive ○ €12.00 in one month, plus €0.80 going to the charity of your choice
If you prefer €12.00 one month, plus €0.80 going to the charity of your choice in Question 76, mark as follows:
○ Receive €12.00 today or receive ● €12.00 in one month, plus €0.80 going to the charity of your choice.

Note the following: As soon as you have once checked the box at the right hand side, you should consider carefully whether it makes sense for you to switch back to the left-hand side at any successive row in any of the seven blocks. Consider decision number (9) and suppose you prefer receiving €12.45 in one month over receiving €12.00 today. Then it seems most likely that you will prefer receiving €12.50 in one month even more to receiving €12.00 today, because €12.50 is more money than €12.45 which you preferred to receiving €12.00 today before.

- Decide for the numbers 1 till 60 whether you would like the payment for sure sooner, or the payment for sure later.
- Decide for the numbers 61 till 120 whether you would like the payment for sure sooner, or the payment for sure later that includes a payment made to a charity.
- Decide for the numbers 121 till 140 whether you would like a larger payment for sure today, or a smaller payment for sure today where the difference is a payment made to a charity.

Please answer this for each possible number (1) through (140) by filling in one box for each possible number. **One of these numbers will be randomly selected by the computer and will be implemented**.

WHAT WILL YOU DO IF YOU GET A NUMBER BETWEEN 1 AND 140?
You will be paid your chosen payment. The choices you make could mean a difference in payment of up to than €6.00, so CHOOSE CAREFULLY!!!

If you chose to be paid today, you will receive an email later today (10th of June) from PayPal. If you do not have a PayPal account yet, PayPal will automatically setup an account. You can claim the money by having it transferred to your account. If paid at one of the later dates, you will receive an email from PayPal on that date.

If your payment involves a payment to a charity, we will transfer the payment to the charity of your choice on the specified date and **email you the receipt**. For more information on the charities please refer to the separate information sheet you find on your desk.

If there are any problems in receiving your payments, you can call or e-mail Professor Stephanie Rosenkranz. She will then hand-deliver you the payment. We will provide you with her contact details at the end of the experiment.

- Questionnaire -

After the 140 decisions you will be asked to fill in another short questionnaire. In the meantime your earnings will be calculated. Please remain seated until you are allowed to leave.

Instructions Individual Public Good Game – Control Treatment

Experimental Laboratory for Sociology and Economics Universiteit Utrecht

- Instructions -

Please read the following instructions carefully. These instructions state everything you need to know in order to participate in the experiment. If you have any questions, please raise your hand. One of the experimenters will approach you in order to answer your question. The rules are equal for all the participants.

The instructions which we have distributed to you are solely for your private information. It is prohibited to communicate with the other participants during the experiment. Turn off your mobile phone and put it in your bag. Also, you may only use the functions on the screen that are necessary for the functioning of the experiment. If you violate these rules, we shall have to exclude you from the experiment and from all payments. Should you have any questions, please ask one of the experimenters.

During the experiment we shall not speak of Euros but rather of ECU. During the experiment your entire earnings will be calculated in ECU. At the end of the experiment the total amount of ECU you have earned will be converted to Euros at the following rate:

10 ECU = 3.00 Euro

At the beginning of the experiment each participant receives 12 Euros (40 ECU) for participating and for filling in the questionnaires. At the end of the experiment your entire earnings from the experiment will be immediately paid to you in cash, without other participants being able to see how much you earned. Further instructions on this will follow.

- Overview of the experiment -

The experiment consists of two parts. For the *first part* you are asked to answer a short questionnaire. Please take your time to fill in this questionnaire accurately. After every participant answered the questionnaire, the second part of the experiment will start.

The *second part* of the experiment is divided into different periods. In total, the second part of experiment consists of 20 periods, divided in two sequences of 10 periods. **At the end of the experiment the computer will randomly select one period out of each sequence for payment. Therefore, every decision you make can determine your final payment with equal probability.**

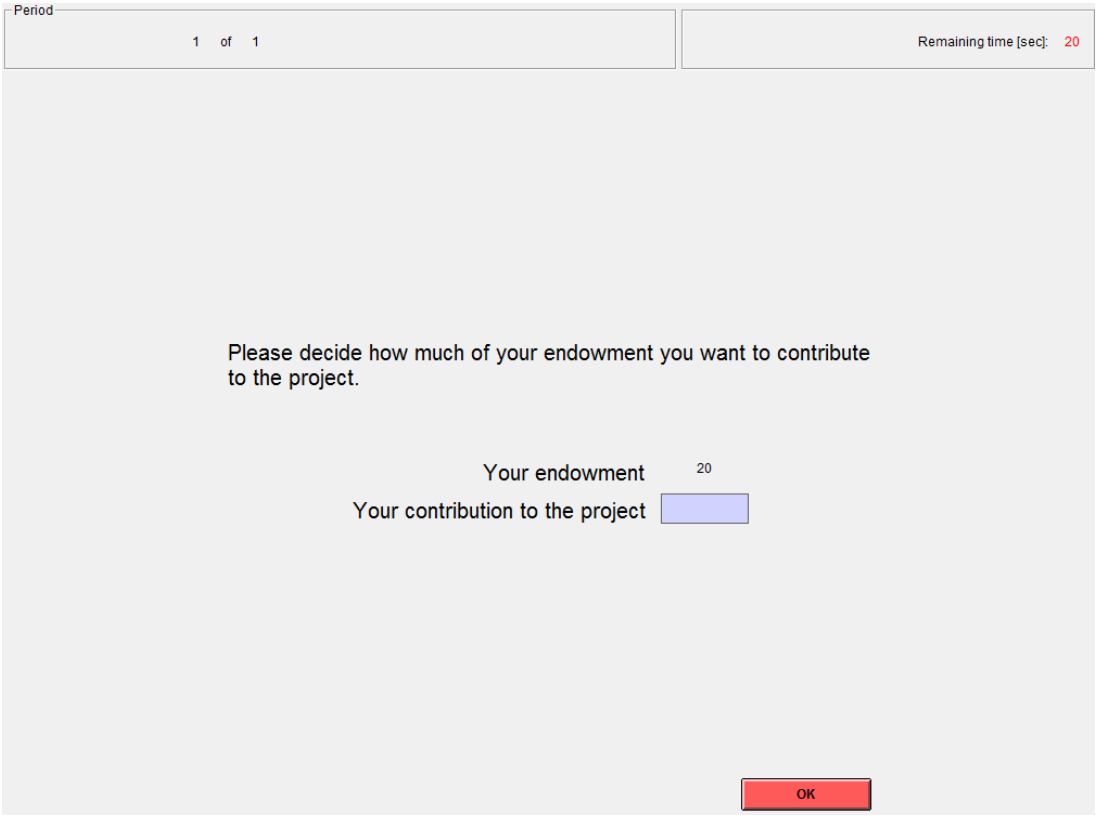
At the beginning of each sequence of 10 periods the participants are divided into groups of four. You will therefore be in a group with 3 other participants for one sequence of 10 periods. After these 10 periods, the groups are randomly re-matched. In each sequence of 10 periods your group will therefore consist of different participants.

The following pages describe the course of the second part of the experiment in detail:

- Detailed information on the second part of the experiment -

In each sequence, each participant can decide over half of their 40 ECU. We call this 20 ECU the participants' endowment. In each period, your task is to decide how to use your endowment. You have to decide how many ECU you want to contribute to a project and how much to keep to yourself. The consequences of your decision are explained in detail below.

At the beginning of each period the following input-screen will appear:

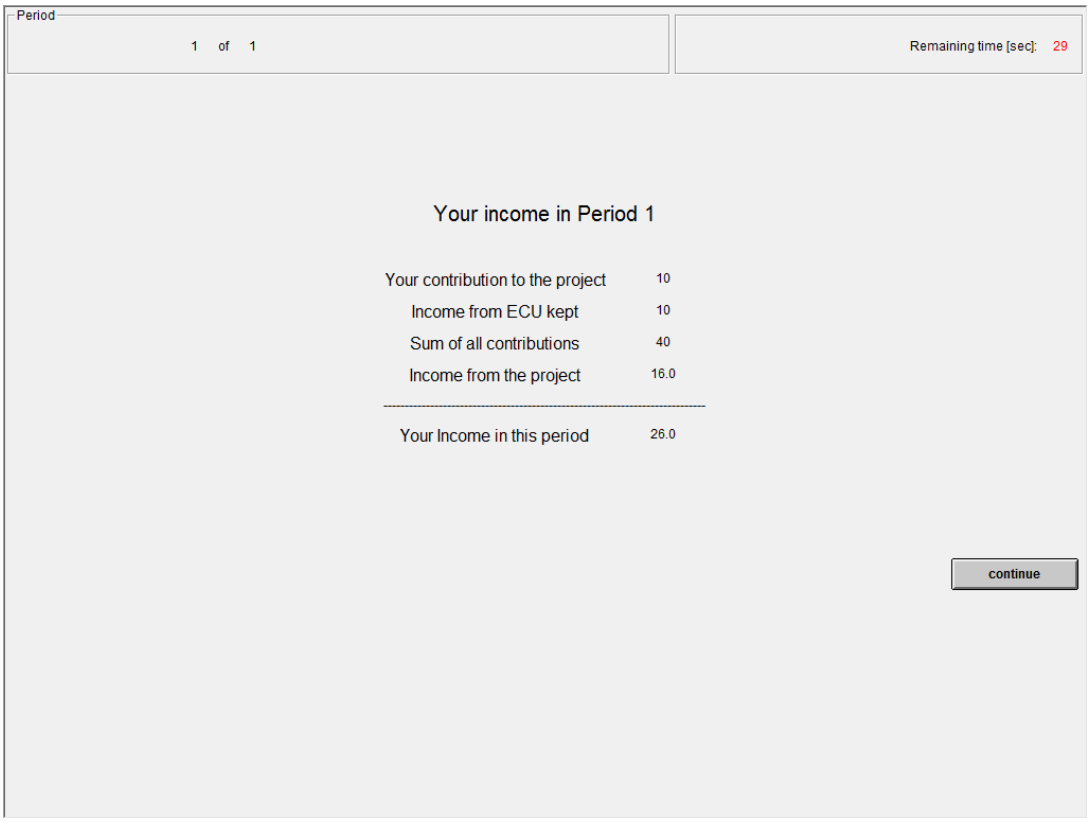


The number of the period appears in the top left corner of the screen. We ask that you make your decision within 30 seconds, as displayed in the top right corner of the screen.

Your endowment in each period is 20 ECU. You have to decide how many ECU you want to contribute to the project by typing a number (a multiple of ten) between 0 and 20

in the input field. This field can be reached by clicking it with the mouse. As soon as you have decided how many ECU to contribute to the project, you have also decided how many ECU you keep for yourself: This is (20 – your contribution) ECU. After entering your contribution you must press the O.K. button (either with the mouse, or by pressing the Enter - key). Once you have done this your decision can no longer be revised.

After all members of your group have made their decision the following income screen will show you the total accumulated amount of ECU contributed by all four group members to the project (including your contribution). Also this screen shows you how many ECU you have earned at the first period. The income screen after the first period:



Your income consists of two parts:

1. the ECU which you have kept for yourself ("Income from ECU kept")
2. the "Income from the project", which is calculated as follows:

The accumulated amount put in the project by all four group members is multiplied by a factor of 1.6. The resulting amount is then equally distributed among the four group members. Thus, your income from the project is 0.4 times the sum of the contribution of all 4 group members to the project.

Your income in ECU of a period is therefore: (20 - your contribution to the project) + 0.4*(total contributions to the project).

The income of each group member from the project is calculated in the same way, this means that each group member receives the same income from the project. Suppose the sum of the contributions of all group members is 60 ECU. In this case each member of the group receives an income from the project of: 0.4*60 = 24 ECU. If the total contribution to the project is 9 ECU, then each member of the group receives an income of 0.4*9 = 3.6 ECU from the project.

For each 1 ECU you keep for yourself you earn, of course, an income of 1 ECU. Instead, if you contributed this 1 ECU to the project, the total income of the group from the project would rise by 1.6 ECU. Since this amount is equally distributed among the group members, your income from would rise by 0.4*1 = 0.4 ECU. In addition, you earn an income for each ECU contributed by the other members to the project. For each 1 ECU contributed by any member you also earn 0.4*1 = 0.4 ECU. Your contribution to the project thus also raises the income of the other group members, and their contribution raises yours.

Please remember: at the end of the experiment the computer will randomly select one period out of each sequence for payment. Therefore, every decision you make can determine your final payment with equal probability.

In the first two periods you have 45 seconds and in the remaining periods 30 seconds to view the income screen. If you are finished with it before the time is up, please press the continue button (again by using the mouse or pressing the Enter key).

At the end of the first sequence of 10 periods you will be informed on the screen that the groups will be randomly re-matched and that you will be in a group with 3 new participants for the next 10 periods. You must press the O.K. button (either with the mouse, or by pressing the Enter - key) to confirm that you are aware of the new group composition. Once every participant pressed the O.K. button, the next 10 periods will start, in which your decision situation is equivalent to the first 10 periods.

- Questionnaire -

After the 20 periods you will be asked to fill in another short questionnaire. In the meantime your earnings will be counted. Please remain seated until the payment has taken place.

Instructions Individual Public Good Game – Norm Treatment

Everything equal except for the last *italic* paragraph

(…)

At the end of the first sequence of 10 periods you will receive feedback on how much you contributed to the project relative to the average contribution to the project of all participants in the room. You have 45 seconds to view the feedback screen. If you are finished with it before the time is up, please press the continue button (again by using the mouse or pressing the Enter key).

After that, you will be informed on the screen that the groups will be randomly re-matched and that you will be in a group with 3 new participants for the next 10 periods. You must press the O.K. button (either with the mouse, or by pressing the Enter - key) to confirm that you are aware of the new group composition. Once every participant pressed the O.K. button, the next 10 periods will start, in which your decision situation is equivalent to the first 10 periods.

At the end of the second sequence of 10 periods you will again receive feedback on how much you contributed to the project relative to the average contribution of all participants in the room.

Instructions Individual Public Good Game – Ranking Treatment

Everything equal except for the last *italic* paragraph

(…)

At the end of the first sequence of 10 periods you will receive feedback on how much you contributed to the project relative to the average contribution to the project of all participants in the room. All group members will be ranked according to their contribution to the project. You will be informed about your ranking in your group and about your group name (a colour) on the screen.

When your group is called up, you will be asked to put up the respective sign of your rank (which you find on your desk) on the wall of your cubicle such that and everybody in the room will see your relative position. You have time to view the ranking until the experimenter asks you to press the continue button (again by using the mouse or pressing the Enter key).

After that, you will be informed on the screen that the groups will be randomly re-matched and that you will be in a group with 3 new participants for the next 10 periods. You must press the O.K. button (either with the mouse, or by pressing the Enter - key) to confirm that you are aware of the new group composition. Once every participant pressed the O.K. button, the next 10 periods will start, in which your decision situation is equivalent to the first 10 periods.

At the end of the second sequence of 10 periods you will again receive feedback on how much each of the other group members contributed to the project. All group members will be again ranked according to their contribution to the project and everybody in the room will again see your relative position.

Instructions Manager Public Good Game – Control Treatment

Experimental Laboratory for Sociology and Economics Universiteit Utrecht

- Instructions -

Please read the following instructions carefully. These instructions state everything you need to know in order to participate in the experiment. If you have any questions, please raise your hand. One of the experimenters will approach you in order to answer your question. The rules are equal for all the participants.

The instructions which we have distributed to you are solely for your private information. It is prohibited to communicate with the other participants during the experiment. Turn off your mobile phone and put it in your bag. Also, you may only use the functions on the screen that are necessary for the functioning of the experiment. If you violate these rules, we shall have to exclude you from the experiment and from all payments. Should you have any questions, please ask one of the experimenters.

During the experiment we shall not speak of Euros but rather of ECU. During the experiment your entire earnings will be calculated in ECU. At the end of the experiment the total amount of ECU you have earned will be converted to Euros at the following rate:
10 ECU = 3.00 Euro

At the beginning of the experiment each participant receives 12 Euros (40 ECU) for participating and for filling in the questionnaires. At the end of the experiment your entire earnings from the experiment will be immediately paid to you in cash, without other participants being able to see how much you earned. Further instructions on this will follow.

- Overview of the experiment -

The experiment consists of two parts. For the first part you are asked to answer a short questionnaire and to read the text you find in the envelope on your desk. Please take your time to fill in this questionnaire accurately and to read the text carefully. After every participant answered the questionnaire, the second part of the experiment will start.

The second part of the experiment is divided into different periods. In total, the second part of experiment consists of two sequences of 10 periods. In total, the second part of experiment consists of 20 periods, divided in two sequences of 10 periods. **At the end of the experiment the computer will randomly select 1 period out of each sequence for payment. Therefore, every decision you make can determine your final payment with equal probability.**

At the beginning of each sequence of 10 periods the participants are divided into groups of four. You will therefore be in a group with 3 other participants for one sequence of 10 periods. After these 10 periods, the groups are randomly re-matched. In each sequence of 10 periods your group will therefore consist of different participants.

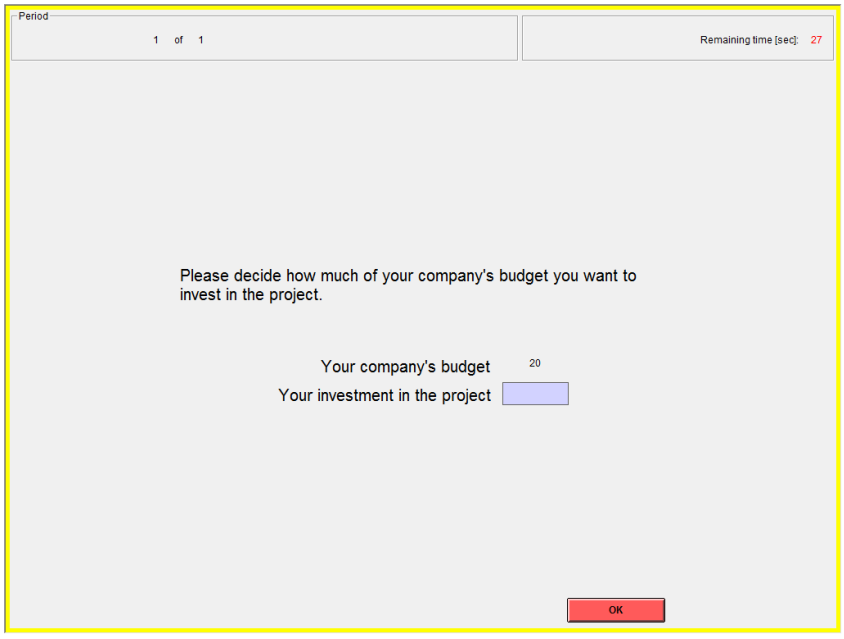
The following pages describe the course of the second part of the experiment in detail:

- Detailed information on the second part of the experiment -

You are the manager of a large company in the Netherlands, listed at the Amsterdam Stock Exchange. The decisions you make will affect the shareholders (the owners of the firm) and the stakeholders (everyone else affected by the firm) of your firm. You will be in this role in all periods of the experiment.

In each sequence, each participant can decide over half of their 40 ECU. We call this 20 (thousand) ECU the company budget. In each period, your task is to decide how to use this budget. You have to decide how many ECU you want to invest to a project and how much you invest in your firm. The consequences of your decision are explained in detail below.

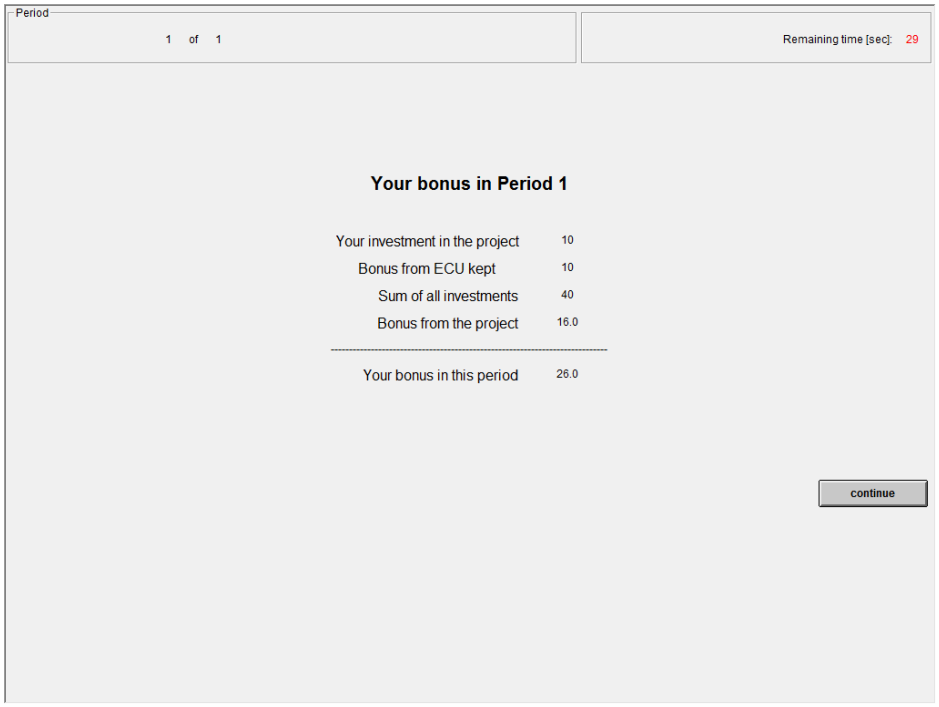
At the beginning of each period the following input-screen will appear:



The number of the period appears in the top left corner of the screen. In the top right corner you can see how many more seconds remain for you to decide on the investment of your company's budget. You are asked to make this decision in 30 seconds.

Your company's budget in each period is 20 thousand ECU. You have to decide how many ECU (in thousands) you want to contribute to the project by typing a number between 0 and 20 in the input field. This field can be reached by clicking it with the mouse. As soon as you have decided how many ECU (in thousands) to invest in the project, you have also decided how many ECU (in thousands) you invest into your company: This is (20 thousand – your investment in the project) ECU. After entering your investment in the project you must press the O.K. button (either with the mouse, or by pressing the Enter - key). Once you have done this your decision can no longer be revised.

After all members of your group have made their decision the following income screen will show you the total accumulated amount of ECU invested by all four group members to the project (including your investment). Also this screen shows you how many ECU you have earned as a manager. The income screen after the first period:



Your bonus as a manager is 1 ECU per thousand ECU company income, which consists of two parts:

1. the ECU which you have invested in your company ("Income from ECU invested")
2. the "Income from the project", which is calculated as follows:

The accumulated amount invested in the project by all 4 group members is multiplied with a factor of 1.6. The resulting amount is than equally distributed among the 4 group members. This is your company's income from the project. Thus, your company's income from the projects is 0.4 times the sum of contribution of all 4 group members to the project.

Your bonus in ECU of a period is therefore: 0.001*((20 thousand - your investment in the project) + 0.4*(the sum of contributions to the project)).

The bonus of each group member from the project is calculated in the same way, this means that each group member receives the same bonus from the project. Suppose the sum of the investments of all group members is 6 thousand ECU. In this case each member of the group receives a bonus from the project of: 0.001*0.4*6 thousand = 24 ECU. If the total investment in the project is 9 thousand ECU, then each member of the group receives a bonus of 0.001*0.4*9 thousand = 3.6 ECU from the project.

For each thousand ECU you invest in your company you, of course, earn a bonus of 1 ECU. Instead, if you invested these thousand ECU to the project, the total income of the group from the project would rise by 1.6 thousand ECU. Since this amount is equally distributed among the group members, your company's income from the project would raise by 0.4*1=0.4 thousand ECU.

In addition, you earn an bonus for each ECU invested by the other members to the project. For each ECU invested by any member you also earn 0.4*1=0.4 ECU. Your investment to the project thus also raises the bonus of the other group members, and their investment raises yours.

Please remember: at the end of the experiment the computer will randomly select 1 period out of each sequence for payment. Therefore, every decision you make can determine your final payment with equal probability.

In the first two periods you have 45 seconds and in the remaining periods 30 seconds to view the income screen. If you are finished with it before the time is up, please press the continue button (again by using the mouse or pressing the Enter key).

At the end of the first sequence of 10 periods you will be asked to justify the decisions that you have made towards the shareholders (owners of your company) by writing a maximum of 5 sentences on the prepared sheet "A" of paper that you find on your desk. If you fail to do so, or the justification is considered insufficient (e.g. no real words are used) by the experimenter, you will be excluded from payments at the end of the experiment. If you are finished with writing your justification towards the shareholders (owners of your company), please press the continue button (again by using the mouse or pressing the Enter key).

At the beginning of the next period you will be informed on the screen that the groups will be randomly re-matched and that you will be in a group with 3 new participants for the next 10 periods. You must press the O.K. button (either with the mouse, or by pressing the Enter - key) to confirm that you are aware of the new group composition. Once every participant pressed the O.K. button, the next 10 periods will start, in which your decision situation is equivalent to the first 10 periods.

At the end of the second sequence of 10 periods you will be asked to justify again the decisions that you have made towards the shareholders of your company, by writing again a maximum of 5 sentences on the prepared sheet "B" of paper that you find on your desk.

Questionnaire -

After the 20 periods you will be asked to fill in another short questionnaire. In the meantime your earnings will be counted. Please remain seated until the payment has taken place.

Instructions Manager Public Good Game – Norm Treatment

Everything equal except for the last *italic* paragraph

(…)

Afterwards, you will receive feedback on how much you contributed to the project relative to the average contribution of all participants in this session.

You have 45 seconds to view the feedback screen. If you are finished with it before the time is up, please press the continue button (again by using the mouse or pressing the Enter key).

After that, you will be informed on the screen that the groups will be randomly re-matched and that you will be in a group with 3 new participants for the next 10 periods. You must press the O.K. button (either with the mouse, or by pressing the Enter - key) to confirm that you are aware of the new group composition. Once every participant pressed the O.K. button, the next 10 periods will start, in which your decision situation is equivalent to the first 10 periods.

At the end of the second sequence of 10 periods you will be asked to justify again the decisions that you have made towards the shareholders (owners of your company) by writing again a maximum of 5 sentences on the prepared sheet "B" of paper that you find on your desk.

At the end of the second sequence of 10 periods you will again receive feedback on how much you contributed to the project relative to the average contribution of all participants in this session.

Instructions Manager Public Good Game – Ranking Treatment

Everything equal except for the last *italic* paragraph

(…)

Afterwards you will receive feedback on how much each of the other group members invested to the project. All group members will be ranked according to their contribution to the project. You will be informed about your ranking in your group and about your group name (a colour) on the screen.

When your group is called up, you will be asked to put up the respective sign of your rank (which you find on your desk) on the wall of your cubicle such that everybody in the room will see your relative position. You have time to view the ranking until the experimenter asks you to press the continue button (again by using the mouse or pressing the Enter key).

After that, you will be informed on the screen that the groups will be randomly re-matched and that you will be in a group with 3 new participants for the next 10 periods. You must press the O.K. button (either with the mouse, or by pressing the Enter - key) to confirm that you are aware of the new group composition. Once every participant pressed the O.K. button, the next 10 periods will start, in which your decision situation is equivalent to the first 10 periods.

At the end of the second sequence of 10 periods you will be asked to justify again the decisions that you have made towards the shareholders of your company by writing again a maximum of 5 sentences on the prepared sheet "B" of paper that you find on your desk.

At the end of the second sequence of 10 periods you will again receive feedback on how much each of the other group members invested to the project. All group members will be again ranked according to their contribution to the project and everybody in the room will again see your relative position.

Text Manager Priming[52]

In this part of the experiment, you are asked to read an excerpt from the book *The Risk Takers* which describes ten entrepreneurial strategies for success. After that you will receive the instructions for the decision making part of this experiment

Ten Entrepreneurial Strategies for Success
by Renee & Don Martin

Managers have many characteristics in common with one another, and the authors of "The Successful Manager" say that's no coincidence. Find out what ten traits managers share that contribute to their success.

1. Trust Your Gut
Successful managers know when to trust their gut. An expanding body of research from a number of fields -- including economics, neurology, and cognitive psychology -- confirms that intuition is a real form of knowledge. It's a skill you can develop and strengthen -- one that's particularly valuable in the most chaotic, fluid business environments, when you must make critical, high- pressure decisions at a moment's notice. At such times, intuition usually beats rational analysis.

Trusting your instincts also emboldens you to carry out new, untested ideas and ventures, even when nobody else believes in them. It's about seeing the need for a product or new service and just knowing you can make it happen. You may not have the cash on hand to commission a market study or conduct a focus group, but you're still willing to stake your reputation and money on that idea. Why? Because that's what your gut tells you to do.

2. Buck the Conventional Wisdom
Ignore those who say, "It won't work" or "It's never been done that way." Our profiled managers succeeded in large part because they veered away from established formulas and ways of thinking. Don't just blindly accept the so-called best practices of your industry. Look at them with a hypercritical eye. Dissect them, slice and dice them, contemplate different what-if scenarios. Challenging convention can open the door to competitive advantage.

3. Never Let Adversity or Failure Defeat You
Don't accept the limits that others or circumstances place upon you. The ranks of successful managers are filled with men and women who refused to stop believing in themselves, despite the derision of others or heart-breaking failures in their past. As a

[52] The subsequent text is an adapted excerpt from the book "The Successful Manager": 16 Women and Men Who Built Great Businesses Share Their Strategies For Success by Renee & Don Martin.
http://www.businessknowhow.com/startup/entrepreneursuccess.htm

manager you'll undoubtedly experience stressful moments that will test your faith. Just remember, the antidotes are persistence and resiliency.

4. Go on a Treasure Hunt and Find an Underserved Niche
In the business world, there's nothing more exciting than finding an underserved niche representing a lucrative market that everyone else has failed to spot and target. That's like finding gold bullion at a crowded beach - it was there for everyone else to see, but you were the one who took notice of the golden glint in the sand.

5. Spot a new Trend and Pounce
Often, a shift in cultural or economic trends will create new entrepreneurial opportunities. Sometimes that shift arises from advances in technology. Many of our profiled managers recognized emerging consumer needs and desires that signalled new market opportunities.

6. Hit 'Em Where They Ain't
Casey Stengel, legendary manager of the New York Yankees, loved to tell the story of baseball great "Wee Willie" Keeler, who stood at just 5' 4", weighed 140 pounds, and began a streak of eight seasons with two hundred or more hits. The Hall of Famer's bat was only thirty inches. Once a sports reporter asked him how such a small guy could get so many big hits. Willie replied, "Keep your eye clear, and hit 'em where they ain't -- that's all." The same holds true in the business world. Whenever possible, set your sights on areas that your competitors have neglected or ignored.

7. Deliver value for your shareholders
If you are managing a business, always remember that you have been hired to generate real value for your shareholders. If your gut is telling you a certain business idea is a winner that will create shareholder value, take action now. The "perfect" time for a launch will never present itself. More often than not, waiting just gives would-be competitors the opportunity to beat you to the punch. None of the managers we interviewed waited for a sign from heaven. Nonetheless, they saw a market opportunity and grabbed it.

8. Save Your Bucks and Get Noticed Without Expensive Advertising
If your business is on a tight budget, there are plenty of ways to get customers' attention without spending money on advertising. Get your creative juices percolating and try something different. And when an opportunity arises to expose your brand to the masses, don't think twice -- jump right in. Use your own creativity to make your company stand out in a crowd.

9. Exploit Your Competitor's Weakness and Make It Your Strength
The sharpest managers have a knack for viewing the world from the perspective of their customers. That quality can help identify your competitors' vulnerabilities and shortcomings. If your number one competitor has a reputation for slow deliveries, for example, make certain your deliveries arrive in less time. Engage and listen to customers to identify such weaknesses.

10. Never Stop Reinventing Your Company

You know the old adage "If it ain't broke, don't fix it"? The problem with that piece of advice is that it invites complacency - and complacency in business is like a slow leak in a tire. You may not notice the damage it's causing until the thing is completely flat and you can't move forward. Top-performing managers aren't afraid to take chances and keep expanding their product line. They're not afraid to give their business a major overhaul now and then to keep pace with changes in the marketplace. And sometimes a complete face-lift is in order.

Believe that growth and opportunity for a nation's economy are inevitable. Look at the world through the eyes of a manager. Use your imagination to identify market opportunities that others have overlooked. Believe in the power of your ideas and just start the pursuit of your own managerial dream[1].

Now please take your time to answer these questions **with max 2-3 sentences**.

Question 1: After you read about the 10 characteristics of successful managers, could you please give an example of a person who, in your opinion, possesses these qualities and does (did), as a result, manage a profitable business?

Question 2: In addition to this, can you think of at least one benefit of being a manager? You may want to connect your answer with the previous question – what do you think drives (drove) the person to manage the company the way he/she does (did)?

After you have answered these questions, you may proceed with the next part of the experiment.

Charity Information Text

RENEWABLE WORLD

Renewable World is an organization which aims at tackling poverty through renewable energy in poor, remote, off-grid communities where financial or geographical barriers prevent private sector solutions being effective. Currently, its program activities are focused on East Africa and South Asia. In East Africa, the strategy focuses on addressing the specific issues faced by poor people in the region, such as lack of basic infrastructure (roads, energy services, ITC services). The charity targets the most isolated and disadvantaged communities and tries to provide them with affordable renewable energy services. In South Asia, the focus of the charity is on Nepal, and more specifically on the poor people in the most mountainous part of the country. Since people there are influenced by the extreme geographical isolation and large climatic seasonal fluctuations, the charity aims at providing energy service infrastructure and the stimulation of renewable energy manufacturing and distribution facilities.

SOLAR AID

SolarAid is an organization that aims to relieve poverty in the sub-Sahara through facilitating the provision of solar energy to those who are in immediate need. It is a small charity with a big impact: the average household size in east Africa is five persons, so with more than 450,000 solar lights sold since 2012, their work has helped transform the lives of over two million people already. Solar energy can help people to power lamps and do away with expensive kerosene lamps. Families spend about 20% of their income on fuel for these lamps that emit a dangerous and poisonous smoke. Using solar-powered lamps means that people have significantly more money left for their immediate needs, that is, to buy the necessities of life such food and clean water and relief their current state of poverty.

AFRICA PARTNERSHIP PROGRAM
(in cooperation with Hivos)

The Africa Biogas Partnership Program stimulates the building of biogas-installations in six African countries. The use of biogas reduces the emission of greenhouse gases, saves the woods, supplies durable energy and creates new opportunities for women. Besides the positive effect on the climate, the use of biogas installations also gives an economic impulse. Since the introduction of the installations in Kenya, Senegal, Burkina Faso, Ethiopia, Uganda, and Tanzania a whole new sector of biogas-entrepreneurs and masons originated. A biogas installation is not cheap. The smallest installation comes with a cost of €750 euro. The African Biogas Partnership Program subsidizes €300 and the rest has to be paid by the users themselves. That is why the program stimulates micro-credit institutions to invest in the biogas installations. The ambition of the program is to build 50.000 biogas installations in the next four years.

THE CLIMATE GROUP

The Climate Group is an independent, not-for-profit organization working to catalyse leadership for a Clean Revolution: a low carbon future that is smarter, better and more prosperous. A low-carbon economy (LCE), low-fossil-fuel economy (LFFE), or decarbonised economy is an economy that has a minimal output of greenhouse gas (GHG) emissions into the environment biosphere, but specifically refers to the greenhouse gas carbon dioxide. The Clean Revolution is a partnership of international statesmen and governments, business leaders and corporations, thinkers and opinion formers. A Clean Revolution will help avoiding the social, environmental and economic impacts of climate change. A massive up-scale of clean technologies will improve the efficiency and use of our natural resources; it will create jobs and it will boost economic growth.